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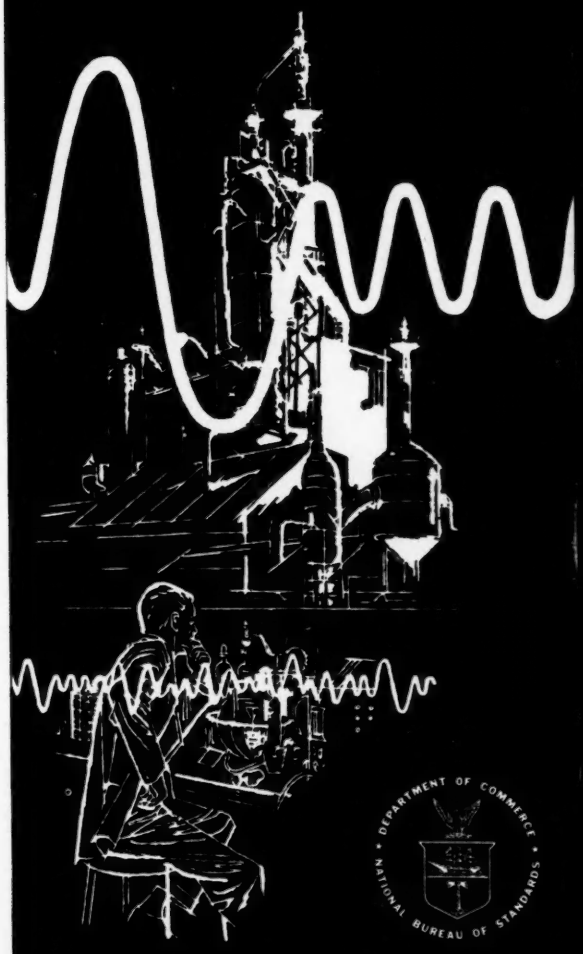

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RESEARCH AND DEVELOPMENT REPORTS

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FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by report/accession number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes.

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting report/accession numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the various indexes will aid in locating those reports. Cumulative indexes are published periodically.

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U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Bernard M. Fry, *Director*

Contents may be reprinted freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

SPECIAL Announcements

Beginning with this issue, reports announced in the "Other Research Reports and Related Material" section of this journal will be listed in the Indexes by division number instead of by page number.

The change brings the indexing system into conformance with the system used in the "Technical Abstract Bulletin" section.

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Pittsburgh, Pa. 15213

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

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Price Gilbert Library
Atlanta, Ga. 30300

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35 West 33rd St.
Chicago, Ill. 60616

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	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-609 053 Div. 1
OTS Prices: HC $3.00/MF $0.75

Kellett Aircraft Corp., Philadelphia, Pa.
EVALUATION OF A HELICOPTER-FUSELAGE-MOUNTED DYNAMIC-NEUTRALIZER STATIC ELECTRICITY DISCHARGING SYSTEM.
Rept. for Jan-Jul 62,
by Juan de la Cierva. Dec 62, 61p
Contract DA44 177TC843, Task 1D121401A14130
TRECOM TR62 93; N63 17102

Unclassified report

Continuation of Contract DA44 177TC728.

Descriptors: (*Helicopters, Static dischargers), (*Static dischargers, Helicopters), (*Aviation safety, Static dischargers), Fuselages, Installation, Safety devices, Electrical equipment, Electrostatics, Static electricity, Electric discharges, Test equipment, Flight testing, Performance (Engineering), Data, Mechanical drawings, Aircraft equipment.

A static electricity discharging system, known as the dynamic neutralizer, has been designed, built and flight-tested, and the results are presented herein. The dynamic neutralizer had been previously tested in a rotor-blade-mounted version as reported in a previous report (AD-406 212). The program discussed in the present report was concerned with the evaluation of this discharger when installed in the fuselage of an Army H-37 helicopter. The test data confirm that the principle of operation of the dynamic neutralizer is not affected by locating the entire device in the fuselage. The dynamic neutralizer utilized in this program was tested with generator voltages up to 60 kilovolts. With this voltage, the H-37 helicopter, operating under the natural charging conditions prevailing at the test site, was discharged to a minimum energy level of 3.4 millijoules from the estimated 1000 millijoules present in the helicopter before the discharger was put into operation. It appears, however, that better performance will be required for operational purposes. It is recommended, therefore, that further research be conducted toward achieving the required performance. (Author)

AD-609 059 Div. 1, 9
OTS Prices: HC $4.00/MF $1.00

General Electric Co., Cincinnati, Ohio.
TANDEM CASCADE THRUST VECTORING RESEARCH PROGRAM.
Rept. for Jun 63-Jun 64,
by J. R. Erwin, D. E. Clark, R. G. Giffin, and J. G. Kirkpatrick. Nov 64, 149p
Contract DA44 177AMC73T, Proj. 1D121401A142
TRECOM TR64 59

Unclassified report

Descriptors: (*Thrust vector control systems, Cascade structures), (*Flight control systems, Thrust vector control systems), Vertical take-off planes, Short take-off planes, Thrust, Camber, Airfoils, Models (Simulations), Wind tunnels, Tests, Fluid mechanics.

Continuous thrust vectoring from horizontal through vertical, to reversed thrust can be accomplished by the use of one or two cascades in series, each employing variable camber airfoils. An experimental wind tunnel evaluation of three types of variable camber airfoils, and experimental scale model investigation of the principle applied to a cruise fan is reported. Flexible camber blades are found to be most satisfactory with a cascade pressure loss coefficient of 0.4. The tandem cascade system provides efficient thrust vectoring varying from 6 percent loss at 67 degrees vectoring, 12 percent loss at 124 degrees vectroing and a maximum of 54 percent reversed thrust. The application of this thrust vectoring system to V/STOL applications is encouraged by these results. (Author)

AD-609 225 Div. 1
OTS Prices: HC $3.00/MF $0.75

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
A METHOD OF ANALYSIS FOR THE DODCO OPTIMAL CONTROLLER.
Final rept. for Sep 62-Jun 64,
by Frank L. George and Ronald O. Anderson.
Jul 64, 69p
Proj. 8219, Task 821904
FDL TDR64 106

Unclassified report

Descriptors: (*Flight control systems, Functional analysis), (*Adaptive control systems, Functional analysis), (*Functional analysis, Adaptive control systems), Systems engineering, Optimization, Computer logic, Nonlinear systems, Digital computers, Stabilization systems, Fourier analysis, Complex variables, Errors, Corrections, Gain, Simulators, Control systems.

An approximate representation of the DODCO Optimum Limited Information Adaptive Controller (DOLIAC) is formulated by a describing function approach. The describing function approximation of the DODCO controller coupled with conventional servo-analysis techniques is found to give reasonably accurate estimates of the stability characteristics of such systems. Results are verified by application to a specific plant and by digital computer simulation of the resulting system. (Author)

AD-609 323 Div. 1, 28
OTS Prices: HC $1.00/MF $0.50

Naval Aviation Safety Center, Norfolk, Va.
PILOT STATURE IN RELATION TO COCKPIT SIZE: A HIDDEN FACTOR IN NAVY JET AIRCRAFT ACCIDENTS,
by George T. Lodge. 1964, 11p

Unclassified report

Presented at the Annual Convention of the American Psychological Association (71st), Division of Military Psychology, Philadelphia, Pa., 4 September 1963. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aviation accidents, Naval personnel), (*Pilots, Anthropometry), Aviation safety, Human engineering, Cockpits, Naval aircraft, Jet planes, Military psychology, Symposia.

A recent anthropometric survey of U. S. Navy pilots showed their average height to be significantly taller than that of the non-Navy population who provided the measurement standards around which most contemporary aircraft cockpit dimensions are based. Taller individuals among Navy pilots, therefore, probably would have more difficulty than shorter ones in operating the aircraft, and one would expect this handicap to be reflected in their respective susceptibility to mishaps. Analysis of 680 jet accidents disclosed that pilots exceeding 72 inches were disproportionately represented (P<.01) in 'pilot-factor' accidents. Implications for pilot selection and assignment are discussed. (Author)

AD-609 342 Div. 1, 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
FIRE HAZARDS ASSOCIATED WITH THE USE OF TITANIUM IN AIRCRAFT.
Technical note,
by D. J. Maykuth and R. H. Ernst. Jun 64, 8p
Unclassified report

Descriptors: (*Aircraft fires, Titanium), (*Titanium, Aircraft fires), (*Fire safety, Titanium), Titanium alloys, Airframes Jet engines, Gas turbines, Ignition, Combustion, Oxygen, Pressure, Jet planes, High-temperature research, Test methods, Friction, Spark ignition, Flammability.

Historically, titanium and its alloys have been proven capable of performing efficiently and satisfactorily in both airframe and aircraft gas-turbine engines. Nevertheless, under certain conditions, titanium and its alloys are known to be capable of ignition and combustion. This note was prepared to review the conditions under which the ignition and combustion of aircraft components were most likely to occur as well as to assess the actual incidences of such fires. Laboratory tests have shown that sheets of commercially pure titanium and several of its alloys can be ignited in air using an oxyacetylene torch and heating these materials to their melting temperatures (about 3000 F). The sensitivity of titanium toward ignition and combustion in oxygen atmospheres increases with increasing oxygen pressure and concentration such that with sufficiently high pressures and concentrations, burning can occur at appreciably lower temperatures.

2. Astronomy, Geophysics and Geography

AD-608 917 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
QUANTITATIVE STUDIES OF BEACH MORPHOLOGY AND BEACH-FORMING PROCESSES.
Final rept. for 1 Jun 59-31 Dec 64,
by Arthur N. Strahler. 1964, 20p
Contract Nonr26668, Proj. NR388 057

Unclassified report

Descriptors: (*Geology, Beaches), (*Beaches, Topology), (*Sedimentation, Beaches), Configuration, Tracer studies, Fluorescence, Erosion, Sand, Ocean waves, Tides, Meteorological parameters, Digital computers, Statistical analysis, Abstracting, New Jersey, California.

The principal objective of this study was to apply quantitative methods, including statistical analysis, to the evolution of beach forms in terms of processes and controlling factors. Experiments have related morphological and structural elements such as beach slope and plan, profile form, and sediment distribution to such dependent variables as wave parameters (height, length, steepness, and direction), tides, currents, and meteorological elements (wind direction and strength). Rates of beach and spit-bar deposition have been measured repeatedly along with other variables to determine the nature and causes of changes.

AD-608 929 Div. 2
OTS Prices: HC $5.00/MF $1.00

Travelers Research Center, Inc., Hartford, Conn.
GENERAL CIRCULATION RESEARCH.
Final rept. for 1 Nov 63-31 Oct 64,
by Barry Saltzman and M. Sankar Rao. Oct 64, 163p
TRC 7462-132
Contract Cwb10763

Unclassified report

Descriptors: (*Atmospheric motion, Mathematical analysis), (*Air mass analysis, Numerical methods and procedures), Wind, Perturbation theory, Thermodynamics, Harmonic analysis, Difference equations, Kinetic theory, Topography, Geophysics, Meteorology.

The report is presented in the form of four papers, the first three of which deal with the theory of the time-average (i.e., normal) motions of the atmosphere, and the fourth dealing with the observed mean energetical properties of the 500-mb waves. In an appendix, an article dealing with the harmonic representation of surface topography is included. This article was not written under contract auspices, but is of great relevance to the overall program of the contract research (especially to the first two papers included in this report). (Author)

AD-608 931 Div. 2
OTS Prices: HC $2.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE: COMPILATION OF ABSTRACTS.
Rept. 49,
9 Dec 64, 26p
ATD P64 65; TT 65 60417

Unclassified report

Rept. of Surveys of Soviet-Bloc Scientific and Technical Literature.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Upper atmosphere, Abstracting), (*Geophysics, Upper atmosphere), Bibliographies, Documentation, Ionosphere, Solar radiation, Van Allen radiation belt, Cosmic rays, Satellites (Artificial), Guided missiles, Data, USSR, Reports, Astrophysics.

This report was prepared in response to ATD Work Assignment No. 3 and is the forty-ninth in a series of monthly reports reviewing Soviet developments in selected problems in astrophysics and geophysics. It is based on materials received at the Aerospace Technology Division in June 1964. Topics covered in this series are as follows: I. Ionospheric Electron Concentrations; II. Solar Radiation and the Ionosphere; III. Van Allen Belts and Cosmic Rays; IV. Telluric Currents; V. Atmospheric Electricity; VI. Nuclear Bursts in the Atmosphere; VII. Satellite and Missile Data; VIII. Arctic and Antarctic Communications; IX. Meteorology of the Upper Atmosphere. Materials in this report deal with Topics II, III, IV, and VII.

AD-608 933 Div. 2
OTS Prices: HC $1.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
THE GEOMETRIC LATITUDE OF A POINT IN SPACE,
by A. A. Izotov. 1964, 6p
AERDL T1758; TT 65 60418

Unclassified report

Trans. of Geodeziya i Kartografiya (USSR) 1964, no. 6, p. 3-6.

Descriptors: (*Astronomical geodesics, Mathematical analysis), (*Geodesics, Mathematical analysis), Position finding, Earth.

The equation of geometric latitude for any position of a point relative to the surface of the terrestrial ellipsoid, the Earth, is derived because of the need to solve geodetic problems for any position in space of points given or to be determined.

AD-608 936 Div. 2
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
PALEOMAGNETISM OF THE MIOCENE LAVAS OF SOUTHEASTERN OREGON.
Final rept., part 2,
by Norman D. Watkins. Apr 64, 88p
Contract AF19 604 8043, Proj. 8623, Task 862301
AFCRL 64 97 2

Unclassified report

Descriptors: (*Terrestrial magnetism, Basalt), (*Basalt, Magnetic properties), (*Geology, Oregon), Well logging, Igneous rocks, Petrology, Geophysics, Volcanoes, Maps.

Magnetic properties of ten widely separated sections of Miocene lavas in Oregon were studied. The results support the following conclusions: (1) Secular variation of the geomagnetic field during part of the Miocene

period has an amplitude similar to secular variations observed at present. (2) Using conventional assumptions, an earlier suggestion that the spin axis was apparently slightly removed from its present position during the Miocene period is supported. A previous suggestion that the geomagnetic pole reached its present position by the Miocene period is not supported. (3) Post-Miocene differential tectonic rotation cannot explain the relative orientations of the mean directions of natural remanent magnetism in sections featuring dual distributions. Large scale post-Miocene differential tectonic rotation about vertical axes in the area seems unlikely. (4) When integrated with the results from other presently available studies of Miocene paleomagnetism, an apparent rapid movement of the ambient geomagnetic field must be attributed to an increase in the relative contribution of the non-dipole component to the total Miocene geomagnetic field. This conclusion may be modified with an increase in data from Miocene rocks in other areas. (Author)

AD-608 958 Div. 2, 20
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
ATOMIC COLLISION PROCESSES RELATING TO THE IONOSPHERE,
Research memo. for 1 Sep-30 Nov 64,
by A. V. Phelps and G. J. Schulz. 3 Dec 64, 3p
WRL-64-9E2-113-M3
Contract Nonr258400, Proj. 3720, ARPA Order 125 63
Unclassified report

Descriptors: (*Ionosphere, Nuclear reactions), (*Nuclear reactions, Ionosphere), Oxygen, Carbon dioxide, Pair production, Nitrogen, Ionization potentials, Atoms, Elastic scattering, Mass spectroscopy, Nuclear physics.

AD-608 969 Div. 2, 25
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
ATTEMPTED EXPLANATIONS OF BALL LIGHTNING.
Physical Sciences Research Papers,
by Edmond M. Dewan. Nov 64, 22p
Proj. 8627
AFCRL 64 927; AFCRL PSRP67
Unclassified report

Descriptors: (*Lightning, Theory), (*Electric discharges, Atmospheric electricity), (*Atmospheric electricity, Lightning), Combustion, Plasma physics, Dust, Electromagnetic waves, Cosmic rays, Quantum mechanics, Meteorological phenomena, Electric arcs, Spheres, Geophysics.

Ball lightning has until this time defied physical explanation. This report summarizes the requirements that must be satisfied by any valid theory, reviews and evaluates previous theories, and evaluates the new theory of Finkelstein and Rubenstein developed under an AFCRL-monitored grant. It is concluded that the latter theory is the only promising one to date but that even this theory needs to be modified. A modification is proposed which would remove the remaining objections and it is suggested that experiments rather than further theoretical development will constitute the next decisive step. Previous theories discussed are: combustion, confined plasma, dust, electromagnetic radiation, cosmic ray, and quantum mechanics.

AD-608 971 Div. 2
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
MEASUREMENT OF THE SIZE SPECTRUM OF CLOUD AND FOG PARTICLES,
by A. E. Mikirov. Mar 64, 10p AmMetSoc-T-R-434
Contract AF19 628 3880
TT 65 60421
Unclassified report

Ob Izmerenii Spektra Raspredeleniya Chastits v Oblakakh, trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Geofizicheskaya, 1957, no. 4, p. 512-515.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Clouds, Particle size), (*Fog, Particle size), Scattering, Spheres, Optics, Photomicography, Photocathodes, Photomultipliers, USSR.

A photoelectric method of measuring the size distribution of particles in clouds and fogs is described. This method is based on efficient use of the scattering function of spherical transparent particles. The method was tested and rated under laboratory conditions, and the results are given of measurements of the size spectrum of particles under natural conditions.

AD-608 975 Div. 2
OTS Prices: HC $7.30/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE THEORY OF THE FIGURE OF THE EARTH,
by V. V. Brovar, V. A. Magnitskii, and B. P. Shimbirev. 27 Nov 64, 430p
FTD TT64 930; TT 65 60422
Unclassified report

Unedited rough draft trans. of mono. Teoriya Figury Zemli, Moscow, 1961, 256p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Geodesics, Textbooks), (*Earth, Textbooks), Astronomical geodesics, Gravity, Theory, USSR, Terrain, Potential theory, Boundary value problem, Green's function, Differential geometry, Differential equations, Vector analysis, Integral equations.

Contents:
Forms of attraction potentials and their properties
Boundary-value problems of potential theory
The force of gravity and the earth's figure
The earth's normal gravitational field
Theory of determination of the external potential and the surface of the earth
Reduction of the force of gravity
A regional study of the earth's figure
Projection of regional gravimetric surveys. Evaluation of accuracy. A set of master curves.
A study of the external gravitational field of the earth as a whole
Application of the theory of the potential to gravimetric prospecting.

AD-608 976 Div. 2
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
THE NATURE OF NOCTILUCENT CLOUDS,
by S. P. Dobrovol'skii. May 64, 9p
AmMetSoc-T-R-441
Contract AF19 628 3880
TT 65 60423
Unclassified report

Priroda Serebristykh Oblakov, trans. of Priroda (USSR) 1964, v. 53, no. 3, p. 87-89.

Descriptors: (*Noctilucent clouds, Meteorology), (*Meteorology, Noctilucent clouds), Condensation, Meteors, Meteorites, Atmosphere, Upper atmosphere, Troposphere, Silicates, USSR.

There are several hypotheses on the nature of noctilucent clouds, but the two deserving most attention and which are discussed here, are the condensation hypothesis and the meteoric hypothesis. The first hypothesis states that noctilucent clouds result from the condensation of water vapor transported by ascending air currents from the troposphere into the upper atmosphere as a result of vertical mixing. The second hypothesis states that noctilucent clouds consist of mineral particles of silicate composition and of extraterrestrial origin.

AD-609 015 Div. 2, 25
OTS Prices: HC $3.00/MF $0.75

Center for Atmospheric and Space Physics, Univ. of Maryland, College Park.
THE DEVELOPMENT OF A PROBE SYSTEM FOR THE MEASUREMENT OF PLASMAS IN THE UPPER ATMOSPHERE.
Final rept. for 1 Apr 59-30 Sep 62,
by Richard T. Bettinger. Sep 63, 60p
Contract AF19 604 5575, Proj. 4603, Task 460311
AFCRL 64 102

Unclassified report

Descriptors: (*Plasma physics, Upper atmosphere), (*Probes (Electromagnetic), Ionosphere), (*Plasma medium, Probes (Electromagnetic)), Electron density, Ionspheric distrubances, Temperature, Ions, Measurement, Telemeter systems, Flight testing, Airborne, Instrumentation, Plasma physics, Energy, Voltage.

The problem of the measurement of ionospheric parameters, particularly under unusual or extreme conditions, has been approached by means of a unique in situ probe system consisting of: a Thermal Equalization probe to measure the potential of the carrier platform; a Pulse probe to measure the electron concentration and energy distribution; and a Langmuir probe to measure positive ion temperatures. In addition, the requisite support systems including telemetry and flight vehicles have been developed. The entire system has been proven by flight tests. (Author)

AD-609 040 Div. 2, 12
OTS Prices: HC $2.00/MF $0.50

Wolf Research and Development Corp., West Concord, Mass.
DATUM AND/OR STATION LOCATION FROM BALLISTIC CAMERA OBSERVATIONS ON SATELLITES.
Scientific rept.
by Harry R. Kahler. Sep 64, 33p WRDC-64-3897-5
Contract AF19 628 3897, Proj. 5930, Task 5930 03
AFCRL 64 872

Unclassified report

Descriptors: (*Geodesics, Photogrammetry), (*Photogrammetry, Geodesics), Astronomical geodesics, Satellites (Artificial), Beacon lights, Position finding, Ballistic cameras, Simulation, Numerical methods and procedures.

The results of a study to determine the accuracy with which datums can be positioned relative to the geocenter from ballistic camera observations on a satellite are presented herein. The study utilizes simulated observations on a postulated satellite borne optical beacon. The satellite is taken to be in a 400 nm, low eccentricity orbit. Recommendations are made for maximum utilization of such a satellite for geometric geodetic purposes (i.e., datum and/or station location.) Conclusions are that a three-dimensional uncertainty of five to ten meters can be achieved utilizing the short arc technique (an arc of 4000 to 5000 miles.) It is felt that long arc reductions for geometric purposes with ballistic camera observations only, are operationally impractical and although theoretically attractive, should be dismissed as having any major potential in a geodetic satellite program. (Author)

AD-609 127 Div. 2
OTS Prices: HC $6.00/MF $1.25

Defense Research Corp., Santa Barbara, Calif.
STUDY AND INVESTIGATION OF THE PROPAGATION OF WHISTLER MODES THROUGH THE IONOSPHERE.
Final rept.,
by B. A. Lippmann, Philip J. Wyatt, and Victor A. Erma.
Sep 64, 202p
Contract AF30 602 3082, Proj. 5579, Task 557902
RADC TDR64 283

Unclassified report

See also AD-268 726.

Descriptors: (*Whistlers, Ionospheric propagation), (*Ionospheric propagation, Whistlers), (Atmospheric electricity, Ionospheric propagation), Attenuation, Electromagnetic fields, Ionosphere, Electron density, Refractive index, Scattering, Absorption, Atmospheres, Digital computers, Programming (Computers), Mathematical models, Electromagnetic waves.

Specific information was sought concerning the attenuation and dispersion of whistlers because of collisional absorption, or because of reflection losses (arising from gradients in refractive index or from discontinuities) in the magneto-ionic duct. The concept that collisional absorption occurs almost entirely within the D region was maintained. Reflection losses due to steep gradients in the refractive index are small, equal to, or lower than 0.1 db; reflection losses at the boundary between the ionosphere and the atmosphere, however, may produce attenuations of 15 db. Discontinuities in the magneto-ionic duct, due to regions of low electron density or to regions of turbulence, appear to have little influence on the intensity of whistler signals. This conclusion is based both on the estimated magnitude of the discontinuities likely to be encountered in the outer atmosphere as well as the machine calculation of whistler modes. Subsidiary investigations were carried: the density distribution and collision frequencies of electrons in the ionosphere; the formal structure of magneto-ionic theory; and two investigations of models of magneto-ionic ducts.

AD-609 159 Div. 2, 25, 30
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE SPECTRAL-POLARIZATION CHARACTERISTICS OF THE LUNAR SURFACE,
by V. G. Teifel' 23 Oct 64, 5p
RSIC 312; TT 65 60459

Unclassified report

Trans. of Astronomicheskii Tsirkulyar (USSR) 1959, no. 205, p. 7-8.

Descriptors: (*Moon, Surface properties), (*Spectroscopy, Luner environment), (*Light, Polarization),

Albedo (Astronomy), Spectra (Visible and ultraviolet).

For the purpose of determining the dependency of the degree of polarization of lunar details on the wave length, a spectrographic survey of the lunar surface was performed near the quadratures by the author in June and July 1959 with a 220mm A3T-7 telescope, using three different positions of a polaroid mounted in front of the spectrograph's slit. Angular positions of the polaroid were: 0 deg, 60 deg and 120 deg. A total of 108 spectrograms of 12 lunar regions were taken, which included Plinius, Mare Tranquillitatis (3 regions), Palus Somni, Ray of Proclus, Oceanus Procellarum (3 regions), Copernicus, and ray aureoles of Copernicus and Kepler. Monochromatic values of polarization degree P sub lambda were calculated by V. G. Fesenkov's formula. An examination of the instrumental polarization, revealed an equality of 0.07 which was constant in the interval 390-620 millimicron. (Author)

AD-609 170 Div. 2, 25
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
GRAVIMETRIC BASE POINTS IN ANTARCTICA,
by Yu. N. Avsyuk and Yu. D. Bulanzhe.
Jun 64, 5p AmMetSoc-T-R-442
Contract AF19 628 3880
TT 65 60443

Unclassified report

Iskhodnye Gravimetricheskie Punkty v Antarktide, trans. of Geofizicheskii Byulleten' (USSR) 1963, no. 13, p. 41-42.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Polar regions, Gravity), (*Gravity, Polar regions), (*Density, Polar regions), (*Weight, Polar regions), Arctic regions, Maps, USSR.

A summary catalogue of gravimetric points determined in Antarctica before 1 January 1962 has been compiled at the Aerogravimetry Laboratory of the Institute of Terrestrial Physics (Soviet Academy of Sciences) on the basis of Sparkman's g-value for Mirnyy, main support base of Soviet expeditions in Antarctica. The catalogue was compiled from the data of the countries participating in the Antarctic gravimetric research program, and these data have formed the basis for gravimetric maps of Antarctica.

AD-609 176 Div. 2, 20
OTS Prices: HC $2.00/MF $0.50

UED Earth Sciences Div., Teledyne Systems Co., Alexandria, Va.
SALMON, 22 OCTOBER 1964.
7 Dec 64, 34p Seismic-DLR-113
Contract AF33 657 12447, Proj. 8 4

Unclassified report

Rept. on VELA UNIFORM Long Range Seismic Measurements program.
Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Seismology, Nuclear explosions), (*Nuclear explosions, Seismology), Underground explosions, Seismic waves, Seismographs, Seismological stations, United States, Instrumentation.

A long range seismic measurements (LRSM) program was established under VELA-UNIFORM Project 8.4 to record and analyze short-period and long-period data from a planned series of U. S. underground nuclear tests. These, and other data, will be used by VELA-UNIFORM participants for studying and developing methods for distinguishing between explosive and earthquake sources. The purpose of this report is to provide an analysis of the LRSM film seismograms from operating mobile field teams; Wichita Mountain Observatory, Oklahoma (WMSO), Uinta Basin Observatory, Utah (UBSO), Blue Mountain Observatory, Oregon (BMSO), Cumberland Plateau Observatory, Tennessee (CPSO), and Tonto Forest Observatory, Arizona (TFSO); and from several experimental or temporary stations operated in connection with other research programs.

AD-609 181 Div. 2
OTS Prices: HC $1.00/MF $0.50

McGill Univ., Montreal (Quebec).
ATMOSPHERIC ENERGY ADVECTION IN THE ARCTIC.
Scientific rept. no. 13,
by E. Vowinckel. Dec 64, 25p AMRG-PM-71
Contract AF19 604 7415, Projs. 7628, 8623,
Tasks 762804, 862303
AFCRL 64 947

Unclassified report

Descriptors: (*Artic regions, Energy management), (*Energy management, Artic regions), Artic Ocean, Heat transfer, Atmospheric motion, Humidity, Water vapor, Atmospheric precipitation, Evaporation.

The Arctic has a strongly negative radiation balance during most of the year. Part of the required energy import is fulfilled by the ocean currents, and the remainder by atmospheric advection. In the present investigation a method was used whereby the net heat import was determined directly from the quantity of energy released. The advection of latent heat was calculated by determining precipitation, evaporation and change in storage of atmospheric water vapour. The various terms and the calculated values for advected latent heat are given in tables, for different areas of the Arctic Ocean, and in illustrations for the two extreme areas. Apart from a very short spell in fall, the advection of latent heat is always positive in the Polar Ocean, contributing as much as 65% of the annual precipitation. Only 12% of the annual precipitation is contributed by advection in the Norwegian-Barents Sea. The net sensible heat advection is given by the energy balance equation for the atmosphere. The calculated values are given in a table and illustration. (Author)

AD-609 216 Div. 2, 25
OTS Prices: HC $6.00/MF $1.25

American Science and Engineering, Inc., Cambridge, Mass.
THE INTERACTION BETWEEN THE SOLAR WIND AND THE EARTH'S MAGNETIC FIELD.
Final rept. for Jan 62-Jan 64,
by S. Frankenthal, J. W. Carpenter, S. Olbert, J. P. Penhune, and G. Siscoe. Apr 64, 213p ASE-509
Contract AF19 628 270, Proj. 7601
AFCRL 64 433

Unclassified report

Descriptors: (*Solar wind, Terrestrial magnetism), (*Terrestrial magnetism, Solar wind), Magnetic fields, Plasma medium, Upper atmosphere, Two-dimensional flow, Theory, Aurorae, Motion, Mathematical analysis, Surfaces, Vector analysis, Power series, Partial differential equations, Boundary value problems, Magnetohydrodynamics, Equations.

The report consists of a study of the interaction between the solar wind and the earth's magnetic field, which takes into account: (1) the presence of an interplanetary

..agnetic field within the solar wind, and (2) the possibility that the solar wind may be penetrated by field lines emanating from the earth. The first part of the report (Chapters I-IV) contains a qualitative discussion of the field and flow patterns which may develop under the conditions stated above. The second part of the report explores two methods for the treatment of the MHD equations which govern the interaction, namely, expansion in spatial coordinates, and parametric expansions. The first method, which is suitable for local studies of the flow, is applied to the region in the immediate vicinity of the stagnation line behind the bow shock. The results of this treatment are embodied in a local field-flow pattern, which reveals several features which can be attributed directly to the presence of an interplanetary field within the solar wind, weak as those fields may be.

AD-609 262 Div. 2, 12
OTS Prices: HC $1.00/MF $0.50

Aeronautical Chart and Information Center, St. Louis Mo.
CARTOGRAPHIC REDUCTION OF RANGER VII MISSION.
Dec 64, 14p
ACIC TP16

Unclassified report

Descriptors: (*Lunar probes, Mapping), (*Space probes, Mapping), (*Moon, Maps), Television cameras, Television communication systems, Terrain, Stereoscopic photography, Stereoscopic map plotters.

On 31 July 1964, the United States spacecraft Ranger VII, crashed on the surface of the Moon. Prior to impact, six television cameras on board made over four thousand image records which were telemetered to Earth and recorded photographically. This paper is intended to describe the procedures used and to give the results of the investigations. The cartographic output from ACIC's reduction of the Ranger VII data is the series of five lunar charts, identified as RLC-1 through RLC-5. These charts, prepared at scales of 1:1,000,000 through 1:1,000, are a coordinated series of graphics which present, in a descriptive sense, the largest part of the new image data recorded during the Ranger VII mission. The principal part of each RLC chart is the relief portrayal, which is a printing of the shaded relief drawing for that scale. These plates were printed in green and gray, with half-tone screens superimposed at 30 degree angular separation. Nomenclature in the area of coverage is based upon the list of named lunar features and system of feature designations of the International Astronomical Union. A partial review of the Ranger VII data was made at the August 1964 meeting of the I.A.U., and one new name, Mare Cognitum, was approved.

AD-609 305 Div. 2, 6
OTS Prices: HC $4.00/MF $0.75

United Aircraft Corporate Systems Center, Farmington, Conn.
PRELIMINARY OPERATIONAL APPLICATION TECHNIQUES FOR AN/TPQ-11,
by R. J. Boucher and R. A. Wexler. Sep 64, 106p
Contract AF19 628 3357
AWS TR180

Unclassified report

Prepared in cooperation with Aracon Geophysics Co., Concord, Mass.
Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Meteorological radar, Weather forecasting), (*Weather forecasting, Meteorological radar), (*Cloud height indicators, Operation), Meteorological instruments, Radar equipment, Atmospheric precipitation, Radiosondes, Clouds, Cloud cover, Temperature inversion, Ice, Ice fog, Atmospheric sounding, K band, Radar, Fog, Radar echo areas, Radar interference, Meterological phenomena.

This report is based upon recent studies and analyses utilizing a modified prototype AN/TPQ-11 Radar Cloud Detecting Set. Data so obtained resulted in modifications being incorporated in the production AN/TPQ-11 now being placed in USAF inventory. Simultaneously with the modifications a plan was originated to interpret the improved data for purposes of forecasting. This document reflects the preliminary conclusions reached in performance of the plan effort, and provides a firm reference for the recognition and interpretation of most cloud types. By periodic updating and extrapolation of the permanent facsimile record it is possible to forecast the arrival and cessation of precipitation and sunshine and the breaking up of fog at a location served by the AN/TPQ-11 radar. In addition, probable icing and turbulence conditions can be forecast for areas adjacent to the radar installation.

AD-609 327 Div. 2, 8
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana. Engineering Experiment Station.
GYRO-INTERACTION ROCKET EXPERIMENTS IN THE LOWER IONOSPHERE.
Aeronomy rept. no. 3,
by Ralph Richard Hodges, Jr. Nov 64, 87p
Contract AF19 628 3900, Proj. 8605, Task 860505
AFCRL 64 653

Unclassified report

Descriptors: (*Sounding rockets, Atmospheric sounding), (*Atmospheric sounding, Plasma physics), (*Plasma physics, Ionosphere), Magnetohydrodynamics, Radiofrequency pulses, Ionization, Electron density, Reaction kinetics, Probes (Electromagnetic), Electromagnetic waves, Ionospheric propagation, Measurement, Geophysics.

Two gyro-interaction rocket experiments were performed in the lower ionosphere. The basic experimental procedure consists in the radiation of periodic pulses of gyrofrequency energy from a transmitter within the rocket payload. With the use of this technique, rate coefficients for two processes were evaluated. With a strong gyrofrequency pulse the local electron density is increased. The rate of removal of these excess electrons, which is believed to be due to attachment, was determined in the range of 45 to 65 km. When the gyrofrequency pulse is weak, the disturbance is only a slight increase of electron energy. This increases the collision frequency and hence affects the absorption of the sensing wave. The rate of loss of excess electron energy was determined by this method. At altitudes above the sensing wave reflection level cross-modulation of plasma noise was detected. An RF probe, with which the frequency dependence of the real part of the input impedance of an antenna was detected, was included in one experiment to measure electron density and collision frequency. In addition the data confirms some of the theoretical implications of Balmain's work. The device was designated a real impedance probe. (Author)

AD-609 328 Div. 2, 25
OTS Prices: HC $1.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
LIQUID-LIKE (TRANSITION) LAYER ON ICE,
by H. H. G. Jellinek. Oct 64, 23p
CRREL SR70

Unclassified report

Descriptors: (*Ice, Surface properties), (*Water, Films), (*Surface properties, Ice), (*Films, Water), Crystal lattices, Crystal lattice defects, Crystal structure, Phase studies, Cooling, Melting, Adhesion, Liquids, Freezing, Viscosity, Plasticity, Polarization, Dipole moments, Surface temperatures, Thermodynamics, Sodium compounds, Surface tension, Entropy, Enthalpy, Chlorides, Scientific research.

A survey of the literature covering about the last hundred years is presented concerning the existence of a liquid-like transition layer on ice below its melting point. The conclusion is reached that the available evidence is very strongly in favor of the existence of such a layer. However, more direct measurements of the properties of such a layer are needed and possible methods for obtaining such information are indicated. (Author)

AD-609 347 Div. 2, 13
OTS Prices: HC $1.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
INSTALLATION OF ICE MOVEMENT POLES IN GREENLAND,
by Steven J. Mock and Donald L. Alford. Jan 64, 19p
CRREL SR67
Unclassified report

Descriptors: (*Glaciers, Motion), (*Greenland, Glaciers), Snow, Structures, Construction, Radar stations, Aluminum, Towers, Installation, Aircraft, Polar regions, Identification.

During May 1963, snow-movement poles were installed at the former HIRAN sites on the Greenland ice sheet to prevent the loss of these positions through snow accumulation. It is anticipated that the poles will project above the snow surface for approximately 10 years, during which time they will be re-surveyed to determine movement of the ice sheet. HIRAN stations and erection techniques are described. (Author)

AD-609 359 Div. 2, 30
OTS Prices: HC $6.00/MF $1.25

Center for Atmospheric and Space Physics, Univ. of Maryland, College Park.
THE DEVELOPMENT OF AN IN SITU PROBE SYSTEM FOR THE MEASUREMENT OF IONOSPHERIC PARAMETERS. VOLUME II.
Scientific rept.,
by Richard T. Bettinger. Jan 65, 237p MUP-TR-277, v. 2
Contracts AF19 604 5575, AF19 604 3861, AFCRL 64 676, v. 2
Unclassified report

Doctoral thesis.
See also AD-609 360.

Descriptors: (*Atmospheric sounding, Radiation measurement systems), (*Radiation measurement systems, Atmospheric sounding), (*Probes (Electromagnetic), Atmospheric sounding), (*Ionosphere, Atmospheric sounding), Sounding rockets, Instrumentation, Photographs, Wiring diagrams, Graphics.

A complete in situ probe system consisting of (1) thermal equalization probes capable of independently measuring vehicle potential, (2) a pulse probe to measure electron concentration and energy distribution and (3) a Langmuir probe which will supply information on positive ion and electron temperatures has been designed and tested. This system, along with the requisite telemetry elements were then packaged into an ejectable rocket payload. Preliminary flight test results are presented indicating generally satisfactory operation of the various probes and pointing to a number of design modifications. Vehicle potentials have been measured on several flights. Its reaction to DC sweeps, vehicle velocity and solar radiation is demonstrated and discussed. It is concluded that a high energy tail in the normal daytime electron energy distribution exists. (Author)

AD-609 360 Div. 2, 30
OTS Prices: HC $6.00/MF $1.50

Center for Atmospheric and Space Physics, Univ. of Maryland, College Park.
THE DEVELOPMENT OF AN IN SITU PROBE SYSTEM FOR THE MEASUREMENT OF IONOSPHERIC PARAMETERS. VOLUME I.
Scientific rept.,
by Richard T. Bettinger. Jan 65, 253p
MUP-TR-277, v. 1
Contracts AF19 604 5575, AF19 604 3861, AFCRL 64 676, v. 1
Unclassified report

Doctoral thesis.

Descriptors: (*Probes (Electromagnetic), Ionosphere), (*Atmospheric sounding, Radiation measurement systems), (*Radiation measurement systems, Atmospheric sounding), (*Ionosphere, Atmospheric sounding), Sounding rockets, Instrumentation, Ionospheric propagation, Measurement, Plasma physics, Telemeter systems, Flight testing.

A complete in situ probe system consisting of (1) thermal equalization probes capable of independently measuring vehicle potential, (2) a pulse probe to measure electron concentration and energy distribution and (3) a Langmuir probe which will supply information on positive ion and electron temperatures has been designed and tested. This system, along with the requisite telemetry elements were then packaged into an ejectable rocket payload. Preliminary flight test results are presented indicating generally satisfactory operation of the various probes and pointing to a number of design modifications. Vehicle potentials have been measured on several flights. Its reaction to DC sweeps, vehicle velocity and solar radiation is demonstrated and discussed. It is concluded that a high energy tail in the normal daytime electron energy distribution exists. (Author)

AD-609 363 Div. 2
OTS Prices: HC $3.00/MF $0.75

California Univ., Los Angeles.
SURFACE WIND PATTERNS IN THE LOS ANGELES BASIN DURING 'SANTA ANA' CONDITIONS.
Final rept. Part 1,
by James G. Edinger, Roger A. Helvey, and David Baumhefner. Sep 64, 84p
Contracts A5FS16563, OCD OS62 143, Proj. 2606
Unclassified report

Prepared in cooperation with Pacific Southwest Forest and Range Experiment Station, Forest Service Berkeley, Calif.

Descriptors: (*Fires, California), (*Wind, Flame propagation), Meteorological parameters, Weather forecasting, Atmospheric motion, Humidity, Gusts, Air pollution, Dust, Sand, Smokes, Fire safety, Terrain, Diurnal variations, Maps.

The results of an analysis of seven years of 'Santa Ana'

wind situations is presented. The surface wind field over the greater Los Angeles area is presented first in statistical terms, percentage frequency of wind directions and mean wind speeds, and then as streamline analyses of individual situations. Areas of strong flow and weak flow are delineated as well as the diurnal fluctuations of the major features in the surface flow pattern. (Author)

AD-609 373 Div. 2
OTS Prices: HC $4.00/MF $1.00

Rutgers Univ., New Brunswick, N. J.
SOILS OF THE HOWARD PASS AREA, NORTHERN ALASKA,
by E. E. MacNamara. 1964, 129p

Unclassified report

Investigation aided by contracts between the Office of Naval Research, Department of the Navy, and the Arctic Institute of North America.

Descriptors: (*Soils, Alaska), (*Alaska, Soils), Aerial photography, Mapping, Topography, Classification, Geological survey, Geography.

The study is an attempt to arrange a mappable presentation of the distribution of soils and soil conditions in a region of the Arctic in which little previous pedologic information was available. This was accomplished by field investigations during the 1961, 1962, and 1963 summer seasons, and by partial characterization of soil individuals through use of chemical, physical, and mineralogical techniques in the laboratory. The findings of this report are presented in chapter form. Chapter One includes a brief description of the area of primary study, the Howard Pass Quadrangle. As they are known, the bedrock geology, surficial geology, physiography, climate, an vegetation are presented. Chapter Two is composed of literature reviews and discussions of soil mapping attempts in the Alaskan Arctic, frost phenomena, the soil-vegetation relationships, aerial photographic interpretation for soil mapping purposes, and the recognized genetic soil groupings. Definitions and descriptions of the individual mapping units and the primary legend are also included in Chapter Two. Chapter Three includes maps of soil distribution and discussions of the maps. Chapter Four is morphological, chemical, and physical data accumulated in the study and its interpretation. Chapter Five presents supplementary studies from areas other than the Howard Pass Quadrangle. (Author)

AD-609 380 Div. 2, 8, 12, 30
OTS Prices: HC $3.00/MF $0.75

TRW Space Technology Labs., Los Angeles, Calif.
INVESTIGATION OF IONOSPHERIC AND TROPOSPHERIC NOISE.
Semiannual rept., 1 Jul-31 Dec 57,
by John E. Taber. 31 Dec 57, 54p
STL/GM-TR-1190-00322
Contract AF18 600 1190

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Atmospheric sounding, Radiofrequency interference), (*Radiofrequency interference, Atmosphere), Ionosphere, Troposphere, Dielectric properties, Electron density, Radio interference, Signal-to-noise ratio, Guidance, Guided missiles, Noise (Radio), Test equipment (Electronics), Wiring diagrams, Geophysics.

Construction of nearly all the ionospheric measurement equipment has been completed. Preliminary testing indicated that successful operation of the equipment can be expected. Some improvements, particularly the receiver noise figure, are needed. Plans have been made to conduct a demonstration of the equipment early in January 1958. The equipment will be moved to Florida during February 1958. (Author)

AD-609 384 Div. 2, 6, 12
OTS Prices: HC $3.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DRAFT PROGRAM DESCRIPTION FOR RADAR AND RADIOMETRIC LUNAR SURFACE STUDIES.
Revised ed.,
ed. by P. B. Sebring. 20 Nov 64, 52p
LL-GR-1964-65
Contract AF19 628 500
ESD TDR64 580

Unclassified report

Descriptors: (*Moon, Exploration), (*Lunar probes, Radiometers), (*Radar, Lunar probes), Lasers, Surface properties, Lunar surface vehicles, Landing impact, Radar tracking, Antennas, Optical equipment, Temperature, Polarization, Millimeter waves, Lunar environment, Radar echo areas, Beams (Electromagnetic).

This report was prepared in response to the question, 'What information on the nature of the lunar surface, having an important bearing on attempts to land man on the moon, can be gotten from earth-based radar and radiometric systems.' The program in radio selenography described would involve the use of some of the most powerful radars, equipped with the largest antennas in existence today, to make the measurements over a wide range of wavelengths, and with varying degrees of resolution. A summary of results to be expected is presented as is an estimate of the time required to carry out the several portions of the program.

AD-609 401 Div. 2, 30
OTS Prices: HC $4.00/MF $1.00

Autometric Facility, Raytheon Co., Alexandria, Va.
EXPANDED STUDY OF THE APPLICABILITY OF MULTIFACTOR COMPUTER PROGRAMS TO TERRAIN ANALYSIS.
Final rept.,
by Jay H. Simons, James C. Maxwell, John Imbrie, and Vince Manson. 15 Nov 64, 130p
Contract Nonr452300, Proj. NR387 030

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Terrain, Factor analysis), (*Programming (Computers), Mapping), (*Mapping, Programming (Computers)), Geological survey, Maps, Geography, Vector analysis, Geodesics.

The objective of this study was to increase the scope of experimental testing in order to draw conclusions of more universal applicability to terrain analysis. Geomorphic objectives were designed to: (1) increase the areal extent of the test cases; (2) include areas significantly different topographically and geomorphically, from those previously analyzed; (3) engage in experimental testing using a basic set of non-redundant variables, as suggested by the 1963 Autometric work; (4) engage in experimental testing of new variables relating to the surface geometry; and (5) to explore the feasibility of including nontopographic variables such as, vegetation, cultural patterns of land use, surficial geology, and fracture/lineament patterns. In factor and vector analysis the objective was to increase the capacity and flexibility of the program. (Author)

AD-609 404 Div. 2, 12, 30
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
MEASUREMENTS OF THE DENSITY OF FREE ELECTRONS IN THE OUTER IONOSPHERE,
by Donald J. Farmer and W. A. Robinson. 1960, 21p
Contracts AF18 600 1190, AF04 647 165
Unclassified report

Descriptors: (*Electron density, Ionosphere), (*Ionosphere, Electron density), (*Atmospheric sounding, Electron density), Guided missiles, Instrumentation, Electrons, Measurement, Very high frequency, Radio transmission, Doppler effect, Ionospheric propagation, Geophysics, Atmosphere.

Three profiles of the density of free electrons in the ionosphere were measured in conjunction.with test flights of the Atlas intercontinental ballistic missile. Data extend to an altitude of 815 km for the flight of August 2, 1958, to 960 km for the flight of August 28, 1958, and to 1060 km for that of February 4, 1959. Measurements were made using a modification of Berning's method. Below the level of maximum ionization h sub m the agreement with approximate true-height reductions of concurrent terrestrial sounder data is good. Above h sub m the results show general agreement with previously known time-averaged distributions derived from satellite observations. The August 2 flight occurred during a period of above normal solar and magnetic activity. The somewhat large value, 4 x 100000 per cc, observed for the electron density at 800 km, compared to 1 x 1000000 at 365 km (h sub m), may be a result of that activity. It is noted that in the exosphere the altitude dependence of the gradient of the electron density is approximately the same for all the three profiles, whereas at a particular altitude the density itself varied by almost an order of magnitude among the profiles. (Author)

AD-609 410 Div. 2
OTS Prices: HC $1.00/MF $0.50

Oregon State Univ., Corvallis.
OREGON STATE UNIVERSITY SEISMOLOGICAL BULLETIN NO. 3, JANUARY 1-MARCH 31, 1964.
Data rept. no. 17,
by C. E. Schatz and Peter Dehlinger. Oct 64, 10p OSC-Ref-64-33
Contracts AF19 628 2778, Nonr128610, Proj. NR083 102
Unclassified report

Descriptors: (*Seismology, Periodicals), Seismological stations, Seismographs, Universities, Oregon, Earthquakes, Seismic waves, Tables, Geophysics.

Oregon State University operates a World-Wide Standard Seismograph Station at Corvallis and a seismic station at Klamath Falls Oregon. The Corvallis station includes three short-period Benioff seismographs (T sub o = 1 sec, T sub g = 0.75 sec), three long-period Sprengnether seismographs (T sub o = 30 sec, Tg = 100 sec), and a small short-period vertical Benioff seismograph (T sub o = 1.0 sec, T sub g = 0.2 sec) to provide visual recording on the OSU campus. The Klamath Falls station consists of a small short-period vertical Benioff seismograph (T usb o = 1.0 sec, T sub g =0.2 sec), with visual recording on the campus of the Oregon Technical Institute. Tables are presented displaying the following data: sudden beginning of motion, gradual beginning of motion, following phase of arrival, magnitude, depth of focus, and epicentral distance from Corvallis.

3. Chemical Warfare Equipment and Materials

No Entries

4. Chemistry

AD-608 915 Div. 4, 17
OTS Prices: HC $1.00/MF $0.50

Cornell Univ., Ithaca, N. Y.
NUCLEATION OF METAL CRYSTALS ON IONIC SURFACES.
Technical rept. no. 8,
by J. L. Robins and T. N. Rhodin. 1 Oct 64, 21p
Contract Nonr40131, Proj. NR036 035
Unclassified report

Research supported in part by the Advanced Research Projects Agency.
See also AD-401 869.

Descriptors: (*Nucleation, Metallic crystals), (*Gold, Nucleation), (*Magnesium compounds, Oxides), Crystal structure, Reaction kinetics, Ions, Surface properties, Vapors.

A systematic experimental study of the kinetics of nucleation of gold vapor onto the (100) cleavage face of magnesium oxide was made over the temperature range from 209-381C in ultra-high vacuum. The degree to which preferred nucleation occurred was found to depend on the defect structure of the surface. The experimental results are in quantitative agreement with a nucleation model originally developed for a defect-free surface and extended in this study to account for the contribution of point defects. (Author)

AD-608 925 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

American Cyanamid Co., Stamford, Conn.
THE RELATIONSHIPS BETWEEN POLYMERS AND GLASS TRANSITION TEMPERATURES.
Rept. for Jun 63-May 64,
by O. Griffin Lewis. Jul 64, 29p
Contract AF33 657 11224, Proj. 7342, Task 734203
ML/ TDR64 253
Unclassified report

Descriptors: (*Aliphatic compounds, Transition temperature), (*Styrene plastics, Transition temperature), (*Glass, Transition temperature), (*Transition temperature, Polymers), Thermodynamics, Thermochemistry, Molecular structure, Pressure, Viscosity, Relaxation time, Equations.

The parameter T sub 0 was investigated as an indicator of glass formation in simple liquids for which viscosity and density have been published at various temperatures T. It was found that the Gibbs-DiMarzio theory correctly predicts the values of T sub 0 of the n-alkanes with a stiffness energy of 490 cal./mole. The predicted T sub 0 for polyethylene is 129K, which corresponds to a well-known transition. A detailed study of steric factors in polymers is expected to lead to methods of predicting the stiffness energy and hence T sub 0. A free volume theory was developed which accounts satisfactorily for the change in viscosity with external pressure, and which separates the phenomenological effects of temperature and pressure from the structural and molecular factors involved in flow behavior. The adjustable constants have not yet been correlated with chemical structure, however.

AD-608 955 Div. 4
OTS Prices: HC $1.00/MF $0.50

Missouri School of Mines and Metallurgy, Rolla.
ANODIC DISSOLUTION OF ZINC IN POTASSIUM NITRATE.
Technical rept. no. 10,
by W. J. James, M. E. Straumanis, and J. L. Reed.
Nov 64, 16p
Contract Nonr229603
Unclassified report

Descriptors: (*Zn, Valence), (*Valence, Determination), Electrochemistry, Electric currents, Ultrasonic radiation, Temperature, Anodes (Electrolytic cell), Corrosion, Ions, Potassium compounds, Nitrates.

The apparent valence of pure zinc dissolving anodically in 3% KNO3 was determined as a function of current density, temperature, and ultrasonic agitation. The apparent valence of zinc dissolving anodically at 24C at current densities < 30 ma/sq cm is 2.01 ± 0.01. From 30-40 ma the valence diminished and from 42 ma up to about 80 ma/sq cm it remained constant at about 1.87. Ultrasonic vibrations had almost no effect on the apparent valence at high current densities is approximately the same as with no ultrasonic vibrations. In both cases a black film (corrosion product) spalls off the anode but to a larger extent with ultrasonics. At elevated temperatures the apparent valence again decreases with increasing current density and appears to vary as a function of metal history. It was concluded that the normal valency of zinc ions, ±2, does not change during anodic dissolution in nitrate solutions, but the apparent valence of less than 2 arises as a consequence of partial disintegration of the anode.

AD-608 982 Div. 4, 14
OTS Prices: HC $3.00/MF $0.75

United States Rubber Co., Wayne, N. J.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Final rept. for 1 Nov 63-31 Oct 64,
by Harold K. Garner, Gerald J. Klender, and Aspet Merijanian. 30 Nov 64, 54p
Contracts NObs90089, NObs88232, Proj. SR007 03 03, Task 1000
Unclassified report

See also AD-604 733.

Descriptors: (*Polymerization, Phosphonitrile chlorides), (*Heat-resistant plastics, Phosphonitrile chlorides), (*Phosphonitrile chlorides, Polymerization), (*Electric insulation, Polymers), Thermosetting plastics, Thermoplastics, Organic oxygen compounds, Organic nitrogen compounds, Isocyanic acid, Amines, Synthesis (Chemistry), Quinones, Nitriles, Glycols, Alcohols, Copolymerization, Spectra (Infrared).

The objective of the investigation is the development of new thermoplastic and thermosetting resins from phosphonitrilic chloride trimer for high temperature electrical applications. Polymers were prepared by linking together bifunctional phenyl-and phenoxy-substituted trimeric phosphonitriles. Linking groups include oxygen, nitrogen, hydroquinone, tetrahydroxyaromatics and groups derived from the reaction of phosphonitrile isocyanates with glycols or diamines. The oxygen-linked and hydroquinone-linked polymers appear most promising. New syntheses of phosphonitriles of reduced functionality are reported. (Author)

AD-608 999 Div. 4
OTS Prices: HC $1.00/MF $0.50

National Research Corp., Cambridge, Mass.
THERMOCHEMISTRY OF SELECTED COMPOUNDS.
Annual summary rept. for 15 Nov 63-14 Nov 64,

by Ludwig G. Fasolino. 9 Dec 64, 13p
Contract Nonr360800

Unclassified report

See also AD-403 346.

Descriptors: (*Boron compounds, Heat of formation), (*Thermochemistry, Boron compounds), (*Borohydrides, (Hydrolysis), Oxides, Chlorides, Boric acids, Aluminum compounds, Heat of solution, Calorimeters, Temperature sensitive elements.

The work includes measurements of the heats of solution of B2O3 (amorphous), B2O3 (crystalline), H3BO3 and BC13 (liquid). From these measurements the heats of formation were calculated for B2O3 (both forms) and BC13 (liquid). Attempts were made to determine a satisfactory reaction involving aluminum borohydride, the thermochemical results of which would allow a calculation of its heat of formation. A promising solution to this problem appears to be in the elevated temperature (40C) hydrolysis of this compound.

AD-609 002 Div. 4, 14
OTS Prices: HC $0.50/MF $0.50

Rock Island Arsenal, Ill.
EMULSION COPOLYMERIZATION OF SILICON DIHYDRIDES AND DIACETYLENIC HYDROCARBONS,
by R. R. Freeman and E. I. Spearman.
13 Oct 64, 19p
Proj. 1C014501B13A
RIA 64 2899

Unclassified report

Descriptors: (*Silicon compounds, Hydrides), (*Hydrides, Copolymerization), (*Aliphatic compounds, Copolymerization), Silanes, Hydrogenation, Elastomers, Synthetic rubber, Catalysts, Epoxy plastics.

The copolymerization used chloroplatinic acid and related catalysts. The highest molecular weight copolymers were based on chloroplatinic acid catalyzed methylphenysilane and 1, 6 heptadiyne. They were tacky, elastic gums that crosslinked readily upon storage at room temperature. Refluxing the polymers in a benzene solution of an epoxy compound minimized premature crosslinking. No change was noted in the tackiness of the polymers. The type of emulsifier (anionic, cationic, nonionic) used had a considerable effect on the final molecular weight of chloroplatinic acid catalyzed methylphenylsilane-1,6 heptadiyne polymers. Recipes containing anionic soaps gave the highest molecular weights. However, this observation did not hold true for other catalysts or other monomer combinations. In an effort to obtain silcarbane elastomers having improved thermal stability the unsaturated methylphenylsilane-1,6 heptadiyne rubbers were hydrogenated. Unfortunately, the hydrogenated polymers were non-rubbery solids. (Author)

AD-609 025 Div. 4, 10
OTS Prices: HC $1.00/MF $0.50

Stauffer Chemical Co., Richmond, Calif.
HIGH ENERGY OXIDIZERS.
Quarterly technical summary rept. for 1 Aug-1 Nov 64,
by K. O. Christe, J. P. Guertin, and A. E. Pavlath.
1 Nov 64, 25p
Contract Nonr401900, Proj. NR093 035
ARPA Order 399 62

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Oxidizers, Synthesis (Chemistry)), (*Hypochlorites, Chemical properties), (*Chlorine compounds, Fluorides), Stereochemistry, Molecular weight, Ions, Chemical analysis, Dissociation, Nitrogen compounds, Oxides, Complex compounds, Infrared spectroscopy.

The difluorohypochlorite anion, i.e., ClF2(-), a new oxidizer species based on chlorinefluorides, was successfully prepared. Its preparation was achieved in the form of its nitrosyl salt from nitrosylfluoride and chlorinemonofluoride. The complex is a white crystalline solid, which has a 100 mm. dissociation pressure at -51 degrees, and exhibits oxidizing properties. Its composition was established by analysis, molecular weight determination and infrared spectroscopy. It dissociates into the starting materials, NOF and ClF. From a pressure-temperature curve a heat of dissociation of 15.5 kcal/mole was obtained. Conductivity measurements proved that the complex is ionic. Low-temperature infrared spectra of the solid complex showed that the structure, NO(+)ClF2(-), must be assigned to the complex. The most probable structure of the ClF2(-) anion is a trigonal bipyramid (sp3d-hybrid) with the chlorine atom at the center, the two fluorine atoms at the apexes and the three free electron-pairs at the remaining corners. (Author)

AD-609 026 Div. 4, 30
OTS Prices: HC $2.00/MF $0.50

Army Frankford Arsenal, Philadelphia, Pa.
DETERMINATION OF BARIUM, STRONTIUM, CALCIUM, AND IRON IN BARIUM PEROXIDE.
Test rept.,
by George Norwitz. Oct 64, 31p
Proj. 4 4930 1 03
AFA T65 2 1

Unclassified report

Descriptors: (*Barium compounds, Peroxides), (*Barium, Chemical analysis), (*Strontium, Chemical analysis), (*Calcium, Chemical analysis), (*Iron, Chemical analysis), Ketones, Chromates, Oxalates, Nitrates, Alcohols, Sulfates, Spectrophotometers, Spectroscopy, Specifications, Chemical precipitation.

Improved methods are proposed for the determination of barium, strontium, calcium, and iron in barium peroxide. The barium is determined as barium chromate, using the technique of homogeneous precipitation. The filtrate from the barium chromate is treated with ammonium oxalate and ethyl alcohol to precipitate the strontium and calcium oxalates, which are then converted to the nitrates. The strontium and calcium nitrates are separated by the use of acetone and the strontium and calcium are finally precipitated as the sulfates. Iron is determined spectrophotometrically with orthophenanthroline. (Author)

AD-609 108 Div. 4, 17
OTS Prices: HC $3.00/MF $0.75

Philco Research Labs., Newport Beach, Calif.
TUNGSTEN AND MOLBDENUM OXIDATION KINETICS AT EXTREMELY HIGH TEMPERATURES.
Final rept. for 1 Jul 62-1 Jul 64,
by R. W. Bartlett. Sep 64, 71p U-2712
Contract AF33 657 8654, Proj. 7312, Task 731202
ML TDR64 290

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Tungsten, Oxidation), (*Molybdenum,

Oxidation), (*Oxidation, Reaction kinetics), High-temperature research, Oxygen, Pressure, Films, Diffusion, Surface properties, Crystals.

An investigation to determine the processes, mechanisms and rates of oxidation of tungsten and molybdenum has been conducted with primary emphasis on tungsten. The study included four parts. (1) The oxidation rates of polycrystalline tungsten were measured at temperatures from 1300C to near the melting point and oxygen pressures from 10-6 atm to 1 atm. The role of an inert gas diluent in depressing the oxidation rate was also determined. Results were correlated with (a) oxygen molecule sticking probabilities on hot tungsten and (b) oxygen diffusion (free convection) through the tungsten oxide vapor product boundary film adjacent to the tungsten surface. (2) The influence of forced convection from a hypersonic oxygen-argon stream on the oxidation rate was measured and correlated with forced convection theory. (3) Variation in the reaction probability with different tungsten crystal faces was determined using oriented single crystals. Differences in the surface morphology of tungsten faces after oxidation and the role of imperfections were observed. (4) The oxidation rates of polycrystalline molybdenum were measured at temperatures to near the melting point at the same oxygen pressures and using the same experimental methods employed in the initial tungsten study. (Author)

AD-609 162 Div. 4
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone, Arsenal, Ala.
THERMOGRAVIMETRIC STUDY OF ORTHOBORIC ACID, H3BO3. 1. DEHYDRATION AS INFLUENCED BY THE FOLLOWING FACTORS: RATE OF HEATING; DEGREE OF FINENESS AND THICKNESS OF SUBSTANCE; DRY OR HUMID GAS ATMOSPHERE,
by Jean Haladjian and Georges Carpeni. Dec 64, 15p
RSIC 334; TT 65 60446
Unclassified report

Trans. of Societe Chimique de France. Bulletin, 1956, p. 1679-1682.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Boric acids, Dehydration), Reaction kinetics, Heating, Thickness, Atmosphere, Gases, Humidity, Gravimetric analysis, France.

The thermogravimetric curves depend to a large extent on the operating conditions, hence it is advisable to approach them with caution: neither the plateaus--even if characteristic ones--nor their levels are immovable. Not keeping in mind the various factors capable of modifying the curves may not only lead to serious errors--analytical errors for example--but also to a neglecting of new phenomena: e.g. the appearance of the Y plateaus, intermediate between the HBO2 and B2O3 levels--which is normally unpredictable--is capable of throwing light on certain particular aspects of the mechanism of dehydration. The case is the same with the angular inflections. (Author)

AD-609 163 Div. 4
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redsvone Arsenal, Ala.
STUDIES ON THE ISOHYDRIC POINT. XIX. THE HYDRATED GERMANIUM OXIDES GeO2.xH2O.aq. (PREPARATION, THERMOGRAVIMETRY, X-RAYS),
by A. Pietri, J. Haladjian, G. Perinet, and G. Carpeni. Dec 64, 20p
RSIC 335; TT 65 60447
Unclassified report

Trans. of Societe Chimique de France. Bulletin, 1960, p. 1909-1914.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Germanium compounds, Dioxides), (*Hydrates, Chemical bonds), Buffers, Crystal lattices, Chemical reactions, Crystallization, Gravimetric analysis, Synthesis (Chemistry), X-ray diffraction analysis, France.

Specifications are given for the preparation of crystalline samples of GeO2 containing different amounts of water, the sample richest in water containing 5% of the latter. The simultaneously performed study by means of thermobalance and X rays shows that while in the case of the different samples the hexagonal crystal lattice of the so-called 'soluble' form of GeO2 remains the same at all temperatures, the water of hydration may be clearly classified into two distinct categories: (1) weakly bound and reversible; this water leaves the oxide at low temperatures and may be legitimately considered as being simply adsorbed (or absorbed); and (2) firmly bound and irreversible.

AD-609 187 Div. 4
OTS Prices: HC $1.00/MF $0.50

Washington Univ., Seattle.
ROLE OF WATER IN THE REACTION OF FLUORINE WITH TRIFLUOROACETIC ACID TO PRODUCE TRIFLUOROACETYL HYPOFLUORITE.
Technical rept. no. 50,
by Gary L. Gard and George H. Cady. 1964, 9p
Contract Nonr47716, ARPA Order 26 60 Task 2
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fluorine compounds, Synthesis (Chemistry)), (*Water vapor, Chemical reactions), Halogenated hydrocarbons, Fluorine, Acids, Catalysts, Explosive materials.

The purpose of the work is: (1) to determine whether water is actually needed, (2) to obtain some measure of its effect, and (3) to explain its role.

AD-609 207 Div. 4, 16
OTS Prices: HC $1.00/MF $0.50

Louisiana State Univ., Baton Rouge.
MICROBIAL OXIDATION OF HYDROCARBON GASES.
Final rept.,
by C. S. McCleskey. 1964, 5p
Contract Nonr157501, Proj. NR103 289
Unclassified report

Descriptors: (*Hydrocarbons, Oxidation), (*Aliphatic compounds, Oxidation), (*Bacteria, Oxidizers), Gases, Alcohols, Carbon, Organic pigments, Microorganisms.

It was concluded that the methane oxidizing bacteria (using methane as sole carbon source) constitute a group quite unlike those which utilize C2, C3 and C4 hydrocarbons.

AD-609 220 Div. 4, 16
OTS Prices: HC $3.00/MF $0.75

Wyandotte Chemicals Corp., Mich.
POTENTIAL ANTIRADIATION DRUGS.

Final annual rept. for 1 Jul 63-30 Jun 64,
by Peter T. Kan and John D. Behun. 15 Jul 64, 63p
Contract DA49 193MD2469

Unclassified report

Descriptors: (*Radioprotective agents, Synthesis (Chemistry)), (*Amines, Radioprotective agents), Fluorides, Halogenated hydrocarbons, Sulfides, Alcohols.

N-substituted fluoroalkyl derivatives of 2-mercaptoethylamines were synthesized to serve as potential antiradiation drugs. These compounds were prepared from the thioethylation of fluoroalkylamines with ethylene sulfide. Variations in the structures of fluoroalkylamines were achieved by the development of synthetic routes towards simple fluoroalkylamines as well as fluoroalkyl-substituted aminoalcohols. A number of unsuccessful approaches towards the synthesis of 1-(and 2-)perfluoroalkyl-2-mercaptoethylamines were investigated. (Author)

AD-609 248 Div. 4
OTS Prices: HC $1.00/MF $0.50

Cincinnati Univ., Ohio.
PERFLUORINATED AROMATICS IN THE INFRARED REGION 1600 to 700/cm.
Rept. for Jan-Jul 64,
by Allan D. Davidson and Neil T. McDevitt. Oct 64, 15p
Contract AF33 657 10944, Proj. 7360, Task 736005
ML TDR64 315

Unclassified report

Descriptors: (*Aromatic compounds, Absorption spectrum), (*Halogenated hydrocarbons, Spectra (Infrared)), Fluorination, Fluorides, Infrared spectroscopy, Heat-resistant materials, Chemical analysis, Chemical bonds, Polymers, Alkenes, Amines, Vibration.

The question of how useful the infrared region 1600 to 700/cm is for perfluorinated aromatics has not been examined to any great extent. The report studies the absorption spectra of some 50 perfluorinated aromatic derivatives in this region to determine if any analytical characteristic frequencies are present. In general, the region can be of value to the spectroscopist if this data is used with care. (Author)

AD-609 269 Div. 4
OTS Prices: HC $1.00/MF $0.50

Union Carbide Research Inst., Tarrytown, N. Y.
FLUORINE OXIDIZERS.
Quarterly technical summary rept. no. 6, 1 Sep-1 Dec 64,
by R. H. Toeniskoetter and F. P. Gortsema. 1 Dec 64, 17p
Contract DA31 124ARO D77, Proj. 4134C, ARPA Order 402

Unclassified report

Descriptors: (*Oxidizers, Fluorides), (*Fluorides, Oxidation), (*Chlorine compounds, Chemical reactions), (*Platinum compounds, Chemical reactions), Azides, Cesium compounds, Nitrogen compounds, Oxides, Amines, Bromine compounds, Potassium compounds, Alkali metal compounds, Oxidation-reduction reactions, Ions.

Chloryl fluoride reacts with cesium azide at -78 degrees to liberate nitrogen, chlorine and chlorine dioxide. The solid product appears to be CsN2OF in admixture with other cesium compounds. A similar reaction between potassium azide and chloryl fluoride was observed. The reaction of cesium azide with chlorine trifluoride at -78 degrees produces small amounts of chlorodifluoroaine. Consideration of the stoichiometric data obtained for this reaction suggests that a solid N-F species is produced. The reaction of chlorine trifluoride with platinum hexafluoride at -78 degrees gives C1F3.PtF5. Fluorination of C1F3.PtF5 at 325 degrees produced chlorine pentafluoride in 62% yield. However, there was no evidence of formation of PtF6 during the fluorination. At 25 degrees, neither chlorine pentafluoride nor bromine pentafluoride reacts with platinum hexafluoride. At 100 degrees, however, bromine pentafluoride and platinum react to give a substance of composition close to BrF5.2PtF6. (Author)

AD-609 281 Div. 4, 2
OTS Prices: HC $2.00/MF $0.50

Electro-Dynamics Labs., Utah State Univ., Logan.
INFRARED CHEMILUMINESCENCE FROM NITROGEN-OXYGEN REACTIONS.
Scientific rept. no. 1,
by D. J. Baker and W. M. Moore. 1 Apr 64, 50p
Contract AF19 628 3821, ARPA Order 111
AFCRL 64 897

Unclassified report

Descriptors: (*Chemical reactions, Reaction kinetics), (*Oxygen, Chemical reactions), (*Nitrogen, Chemical reactions), (*Transport properties, Energy), Infrared spectroscopy, Luminescence, Nitrogen compounds, Dioxides, Hydrogen, Ozone, Emissivity, Atoms, Molecules, Free radicals, Geophysics, Upper atmosphere.

The objective of the study was to further the understanding of the basic energy transfer processes which occur in chemical reactions between atoms, molecules, and free radical species by the infrared chemilluminescence mechanism. Background information and optical emission spectra are presented for various oxygen, nitrogen and hydrogen reaction species. A strong infrared emission in the region of 2.7 microns through 3.0 microns was observed from the reaction of nitrogen atoms with nitrogen dioxide. (Author)

AD-609 294 Div. 4
OTS Prices: HC $4.00/MF $1.00

Electrochemistry Research Lab., Western Reserve Univ., Cleveland, Ohio.
THE PHYSICAL AND CHEMICAL PROPERTIES OF DILUTE ALKALI METAL AMALGAMS, A REVIEW. PART II: CHEMICAL PROPERTIES AND STRUCTURES.
Technical rept. no. 20,
by Myron O. Davies, Eugene Schwartz, Ernest Yeager, and Frank Hovorka. 15 Jul 63, 147p
Contract Nonr2391 00, Proj. NR359 277

Unclassified report

Descriptors: (*Alkali metal alloys, Mercury alloys), (*Mercury alloys, Chemical properties), (*Electrochemistry, Mercury alloys), Chemical reactions, Liquids, Gases, Air, Oxygen, Carbon dioxides, Sulfur compounds, Dioxides, Nitrogen, Oxides, Molecular structure, Reviews, Bibliographies, Reduction (Chemistry), Sodium alloys, Potassium alloys, Organic compounds, Fuel cells, Voltage, Electrodes, Polarization, Surface properties, Diffusion, Transport properties, Colloids, Chemical compounds, Ammonium compounds, Physical properties.

The present report is the second in a two part series summarizing the literature relating to dilute alkali metal amalgams. The three principal areas covered in this second part are: general chemical properties, electrochemistry properties, structural features. A critical evaluation of the available information has been attempted. All references are listed in a bibliography presented at the end of the report. (Author)

AD-609 375 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
INTERMOLECULAR INTERACTIONS AND THE ELECTRON COUPLING OF NUCLEAR SPINS.
Technical rept. no 78,
by H. S. Gutowsky, J. Jonas, Fu-ming Chen, and R. Meinzer. 20 Nov 64, 8p
Contract Nonr183413, Proj. NR051 215

Unclassified report

Prepared for Publication in the Journal of Chemical Physics.

Descriptors: (*Nuclear spins, Molecular association), (*Fluorine, Chemical reactions), Nuclear spectroscopy, Molecular structure, Isotropism, Temperature, Electrons, Nuclear magnetic resonance, Solvents, Molecular rotation, Fluorides, Aromatic compounds.

The primary purpose of the report is to present some observations of temperature and solvent effects upon the coupling constant between the 2,6 and CF3 group fluorines in perfluorotoluene, and to suggest that the effects result mainly from an intermolecular fluorine-fluorine interaction.

AD-609 385 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
PHOTOIONIZATION OF N2 IN THE 734-805 A REGION,
by G. R. Cook and M. Ogawa. 20 Nov 64, 31p
TDR-469(9260-01)-2
Contract AF04 695 469
SSD TDR64 254

Unclassified report

Descriptors: (*Nitrogen, Photochemistry), (*Ionization, Nitrogen), Spectroscopy, Absorption spectrum, Ionic current, Vibration, Tables.

Absolute photoionization coefficients and ionization efficiencies of N2 were measured in the 734-805 A region using a one-meter Seya-Namioka scanning vacuum monochromator with the Hopfield helium continuum as a background light source. The ion-current spectrum obtained was compared with the absorption spectrum observed photographically. Nearly all of the absorption bands with higher energies than the first ionization potential showed ion current peaks, indicating preionization. However, their ionization efficiencies showed strong fluctuations whose magnitudes decreased toward the shorter wavelengths. The spectral regions with the lowest absorption coefficients (180-340/cm) beyond the first ionization potential showed the highest efficiencies, the values of which were about 80%. Efficiencies of bands with m > or = 5 of the Ogawa - Tanaka Rydberg series were much larger than those of the corresponding bands of the Worley third Rydberg series. The progressions (1) and (2) had a rather high efficiency of 70% which increased slightly with an increase of the vibrational quantum numbers of the upper electronic states. (Author)

AD-609 394 Div. 4, 10
OTS Prices: HC $2.00/MF $0.50

Research Inst., Temple Univ., Philadelphia, Pa.
PRODUCTION, ISOLATION AND IDENTIFICATION OF THE FO., FO2, AND FO3. RADICALS.
Annual Summary rept. no. 1, 1 Oct 63-30 Sept 64,
by A. D. Kirshenbaum and A. V. Grosse. 15 Oct 64, 40p
Contract AF04 611 9555, Proj. 3148, Task 3148 0 1
RPL TR64 163

Unclassified report

Prepared in cooperation with Union Carbide Research Inst., Tarrytown, N. Y.

Descriptors: (*Fluorides, Oxygen compounds), (*Oxidizers, Fluorides), (*Free radicals, Chemical analysis), Ozone, Borides, Propellants, Decomposition, Paramagnetic resonance, Ultraviolet radiation, Gamma rays, Cobalt, Hydrogen, Atoms, Synthesis (Chemistry).

The following oxygen fluorides and O2BF4 were used as sources of free radicals: OF2 (diamagnetic), O2F2 (diamagnetic, decomposes thermally through paramagnetic intermediary), O3F2 (paramagnetic), O4F2 (paramagnetic), O2BF4 (paramagnetic).

5. Communications

AD-608 918 Div. 5, 8
OTS Prices: HC $3.00/MF $0.75

General Dynamics/Electronics, Rochester, N. Y.
PROTOTYPE DIGITAL DATA MODERN EQUIPMENT FOR FIELD EVALUATION OF REAL TIME DATA TRANSMISSION OVER RADIO FREQUENCY CIRCUITS.
Final rept.,
by L. Luke. Jun 64, 61p
Contract AF19 628 3268
ESD TDR64 551

Unclassified report

Descriptors: (*Data transmission systems, Radio transmission), (*Radio communication systems, Digital systems), (*Communication equipment, Radio equipment), Real time, Communication systems, Radiofrequency, Models (Simulations), High frequency, Communication theory, Tests, Analysis, Specifications.

Work described in the following report was undertaken as part of a program aimed at improving digital data transmission over long trans-equatorial paths equivalent to those of the Atlantic Missile Range. The task described herein included the assembly and testing of an efficient digital data transmission equipment for use with HF-SSB radio equipment. The equipment passed its acceptance tests on February 25, 1964. The data transmitter was air-lifted to South Africa and installed at the transmitting station of the Ministry of Post and Telegraph in Olifantsfontein, Transvaal, The Republic of South Africa. The data receiver was installed at the RCA receiving station at Riverhead, Long Island. Testing began in April of 1964 under the direction of the Mitre Corporation. (Author)

AD-609 034 Div. 5, 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
AN ANALYSIS OF DIRECTIONAL VIEWING SCREEN: A COMPARISON TO A MATTE-WHITE SURFACE,
Technical rept.
by Rex S. Sinclair. Sep 64, 18p
Task 1P6 22001A055 03 05
ECOM 2500

Unclassified report

Descriptors: (*Viewing screens, Brightness), (*Surfaces, Viewing screens), Display systems, Images, Reflection, Mathematical analysis, Trigonometry, Vector analysis, Least squares method, Optics, Equations.

Screens used for viewing projected images have been analyzed to consider the effect on brightness as a function of viewing angle caused by making the screen directional in its reflective properties. In each case the screen is compared to a matte-white surface. This surface has the property of brightness being a constant at all viewing angles. Three screens are considered: a beaded screen and two hypothetical screens. The beaded screen is the most directional screen commercially available. (Author)

AD-609 183 Div. 5, 12
OTS Prices: HC $4.00/MF $1.00

Hughes Aircraft Co., Fullerton, Calif.
SATELLITE COMMUNICATIONS TERMINAL AN/MSC 46( ).
Quarterly progress rept. no. 3, 15 Jul-15 Oct 64,
by D. E. Ross. 1964, 134p HAC-FR-64-19-298
Contract DA36 039AMC03744S

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Satellites (Artificial), Communication systems), (*Communication systems, Satellites (Artificial)), (*Microwave communication systems, Satellites (Artificial)), (*Ground support equipment, Satellites (Artificial)), Microwave equipment, Transmitter-receivers, Tracking, Antennas, Satellite antennas.

The object of the AN/MSC-46 program to design, fabricate, assemble, and test a microwave air and ground transportable satellite communication link terminal and all auxiliary items necessary for operation with medium-altitude active satellite repeaters and for operation with 24-hour synchronous satellites. The terminal will provide up to four duplex voice and up to five duplex teletype (one order wire).

AD-609 245 Div. 5, 12
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co.,
Philadelphia, Pa.
COMMUNICATION SATELLITE PROJECT ADVENT BIBLIOGRAPHY,
by S. R. Sadin and H. M. Wittner. 28 Apr 61, 27p
R61SD4227
Contract AF04 647 476

Unclassified report

Descriptors: (*Bibliographies, Communication satellites (Active)), (*Communication satellites (Active), Bibliographies), Reports, Specifications, Launching sites, Design, Orbital trajectories.

The Bibliography of Communication Satellite Project ADVENT is submitted. It presents a listing of reports contributing to the technical progress of the program. The Bibliography will be revised bimonthly during the course of the contract.

AD-609 297 Div. 5, 1
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center,
Atlantic City, N. J.
LONG DISTANCE VHF COMMUNICATIONS SYSTEM TESTS AT BARNSTABLE, MASSACHUSETTS.
Interim rept.,
by O. J. DeZoute. Oct 64, 67p
Proj. 116 10X
FAA RD64 139

Unclassified report

Descriptors: (*Radio communication systems, Tests), Airborne, Transmitter-receivers, Antenna radiation patterns, Very high frequency, Attenuation, Performance (Engineering), Meteorological phenomena, Massachusetts, Graphics, Design, Propagation.

The report contains the results of technical tests and describes characteristics of the FAA Long Distance Communications System at Barnstable, Massachusetts. The system capability and deficiencies are analyzed and discussed in terms of equipment performance and meteorological dependence. Results of the tests indicated that to meet the program objectives, an additional system gain of approximately 40 db is needed. Areas of equip-

ment performance providing sources for system improvement are discussed. The test period climatology and measured meteorological factors are correlated with communications data. Recommendations are made to consider investigations for improvements to the system operations. (Author)

AD-609 309 Div. 5, 1
OTS Prices: HC $2.00/MF $0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
LONG DISTANCE VHF COMMUNICATIONS SYSTEM TESTS AT PALMER, PUERTO RICO.
Interim rept.,
by O. J. DeZoute and Lloyd Pearson. Oct 64, 38p
Proj. 116 10X
FAA RD64 140

Unclassified report

See also AD-609 297.

Descriptors: (*Radio communication systems, Tests), Airborne, Transmitter-receivers, Very high frequency, Attenuation, Performance (Engineering), Meteorological phenomena, Puerto Rico, Navigation, Propagation, Radio signals.

The report contains the results of technical tests performed on the FAA Long Distance VHF Communications System at Palmer, Puerto Rico. The system capability is analyzed and discussed in terms of sub system performance and some related meteorological factors. Results of the tests indicated that the significant rate of signal attenuation was 13.4 db per 100 nautical miles and the associated average usable range capability was 517 nautical miles. Some basic meteorological factors are correlated with communications data. Recommendations are made to terminate experimentation at the Palmer, Puerto Rico, site. Should consideration be given to place the Palmer system into operational status, modifications utilizing a specific equipment arrangement and corrective action are to be initiated prior to such course of action. (Author)

AD-609 314 Div. 5, 8, 12
OTS Prices: HC $5.00/MF $1.25

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
SYSTEM STUDY FOR SUPER MOBILE COMMUNICATIONS SATELLITE GROUND STATION.
Final rept. for 1 Apr-31 Aug 64,
by F. Haber, M. Akiyama, J. Feld, R. Harper, and R. Moff. 30 Oct 64, 189p MSEE-65-06
Contract DA36 039AMC03219E, Proj. 1R3 32 101D253

Unclassified report

Descriptors: (*Communication satellites (Active), Ground support equipment), (*Space communication systems, Ground support equipment), (*Ground support equipment, Space communication systems), Communication equipment, Mobile, Systems engineering, Antennas, Transmitter-receivers, Microwave equipment, Tracking, Control systems, Frequency modulation, Feasibility studies.

The objective of the work described is to investigate the system requirements and to provide the design parameters for a highly transportable communications satellite ground station. The study takes into account the size, weight, complexity, ready mobility, and reliability of the ground station for use with communications satellites at ranges up to, and including, the range of synchronous satellites. Included in the study are the design parameters of the antenna(s), the receiving and transmitting apparatus, and the acquisition, tracking and control system. In addition, optimum modulation methods for this application have been investigated.

AD-609 322 Div. 5, 8
OTS Prices: HC $2.00/MF $0.50

Philco Corp., Palo Alto, Calif.
RELIABILITY DESIGN REVIEW, UHF NARROW BAND DATA LINK TRANSMITTER MODEL TYPE 19A1, GENERAL ELECTRONICS LABORATORIES, INC. (PHILCO TYPE WDL-T-17).
19 Aug 60, 40p WDL-TR-1343
Contract AF04 647 532

Unclassified report

Descriptors: (*Radio transmitters, Narrowband), (*Telemetering transmitters, Narrowband), (*Data transmission systems, Telemetering transmitters), Electronic equipment, Ultrahigh frequency, Telemeter systems, Guided missiles, Space communication systems, Communication equipment, Radiofrequency oscillators, Frequency modulation, Power supplies, Hermetic seals, Magnesium, Containers, Design, Reliability (Electronics).

The design employs low level frequency modulation of a relatively low frequency oscillator (approximately 30mc) suitably multiplied and amplified to provide the required output frequency and power into a 52-ohm load. Vacuum tubes are used in all r-f circuitry. The transmitter group is composed of three major components: (1) Power supply, (2) basic four-watt transmitter, and (3) 15-watt r-f power amplifier. Each of the three component assemblies is separately housed in a hermetically sealed magnesium container. Interconnecting cable connectors are mounted on the top surface of each component. The transmitter was originally designed for operation at an altitude of 80,000 feet for relatively short periods of time and for this reason the containers are pressurized at two atmospheres of air. Primary power input of 240 watts at 28 volts d c is required for the T-17. The narrow band transmitter functions as an integrated portion of a subsystem to provide transmission of telemetry information from vehicle to ground stations during all phases of flight.

AD-609 352 Div. 5, 18, 30
OTS Prices: HC $4.00/MF $0.75

International Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. no. 36, 21 May- 20 Jun 64, 20 Jul 64, 104p IEC-20130
Contract AF19 626 8
ESD TDR64 520

Unclassified report

See also AD-604 863, AD-606 320.

Descriptors: (*Strategic air command, Command and control systems), (*Command and control systems, Strategic air command), Combat information centers, Data transmission systems, Data processing systems, Display systems, Control systems, Remote control systems, Ground support equipment, Programming (Computers).

AD-609 361 Div. 5
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DYNAMIC-RANGE REDUCTION OF VIDEO SIGNALS BY AMPLITUDE COMPRESSION.

Group rept.
by R. D. Behn. 16 Nov 64, 29p LL-1964-59
Contract AF19 628 500, ARPA Order 498
ESD TDR64 575

Unclassified report

Descriptors: (*Video signals, Recording systems), (*Magnetic tape, Video signals), Voltage, Noise, Signal-to-noise ratio, Radar signals, Transformations (Mathematics), Magnetic recording systems, Functions, Probability, Programming (Computers), Punched cards.

Methods of recording a video signal with large dynamic range on a magnetic tape (or other recording medium) that has a smaller dynamic range than that of the signal are discussed. The useful part of the voltage range of the input signal is mapped onto the linear voltage range of the recorder. Several maps are considered with the thought of minimizing the degradation of the final signal by recorder noise. Two mapping functions are found to be useful: a logarithmic function, and a part-linear, part-logarithmic one. The use of these maps entails a reduction in signal-to-noise ratio for large input signals. The relationships among the input signal dynamic range, the recorder dynamic range, and the attainable output signal-to-noise ratios are calculated. Results are presented graphically for several particular cases. (Author)

AD-609 397 Div. 5
OTS Prices: HC $2.00/MF $0.50

CBS Labs., Stamford, Conn.
MICROPHONE, HEAD CONTACT M-123( )/U.
Quarterly progress rept. no. 2, 1 Jun-31 Aug 64,
by Allan J. Rosenheck and Alfred L. DiMattia. 30 Sep 64, 26p
Contract DA28 043AMC00010E, Proj. 1G6 41209D534

Unclassified report

Descriptors: (*Communication equipment, Microphones), (*Microphones, Head), Earphones, Transducers, Design, Accelerometers, Resonance, Speech recognition, Vibration, Tests, Signal-to-noise ratio, Human engineering.

Work performed during the quarter beginning June 1, 1964 and ending August 31, 1964 toward development of a practical head contact microphone is discussed. Final designs of two transducers to be used in contact location research are described. Preliminary head contact measurements revealed wide ranges of signal levels available at the skull, and indicated a need for increased transducer sensitivity. Redesign of both transducers was undertaken, and the modified inertial unit was used in contact location studies. Location data was obtained at a number of head positions and with two talkers. Overall level variations of about ±8 db were obtained. Spectrum analysis of the data was begun, and indicated considerable changes in spectrum as a function of location. (Author)

AD-609 427 Div. 5, 2, 8, 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ESTIMATES OF COMMUNICATION SATELLITE SYSTEM DEGRADATION DUE TO RAIN,
by N. E. Feldman. Oct 64, 35p P-3027

Unclassified report

Descriptors: (*Rainfall, Atmospherics), (*Communication satellites (Active), Atmospherics), (*Atmospherics, Communication satellites (Active)), (*Precipitation static, Rainfall), Satellites (Artificial), Space communication systems, Degradation, Signal-to-noise ratio, Temperature, Performance (Engineering).

The performance of a communication satellite link is influenced by the fact that rain not only attenuates the signal but also adds thermal noise to the other sources of sky noise. The influence of sky noise on the choice of communication satellite system parameters has been studied for some time. Some publications have emphasized the contributions of cosmic noise, and noise due to oxygen and water vapor absorption in the atmosphere to sky noise, but neglected the noise due to rain. A few publications have looked specifically at the problem of the sky noise contribution due to rain. Combining all these sources of noise as a function of frequency and elevation angle is the first task this paper will cover. The combined system degradation at 4 kMc due to both rain effects, i.e., attenuation and noise, as a function of cumulative time distribution is calculated; it may be a key factor in evaluating the worth of better receivers, e.g., cooled parametric amplifiers, at communication satellite ground terminals in regions of heavy and frequent rainfall. Presenting estimates of these time distributions of degradation of the down link due to rain for various system noise temperatures in the absence of rain is the second task of this paper.

6. Detection

AD-609 028 Div. 6, 25, 26
OTS Prices: HC $3.00/MF $0.75

Lansdale Div., Philco Corp., Pa.
PEM FOR GOLD-DOPED GERMANIUM INFRARED DETECTOR TYPE IR400.
Quarterly progress rept. no. 7, 1 Jul-30 Sep 64, by A. Guimento. 30 Sep 64, 57p
Contract DA36 039AMC01464E, Proj. H200
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-605 859.

Descriptors: (*Infrared detectors, Manufacturing methods), (*Germanium, Infrared detectors), Production, Quality control, Life expectancy, Specifications, Tests, Data, Mechanical drawings, Gold, Electrical properties, Circuits, Impurities.

The reported work is on a PEM for producing p-type gold-doped germanium detectors, type IR400. This report covers the seventh quarter of the contract period. Work during this period was concentrated on the preproduction phase of the contract. The preproduction samples were completed during this quarter, and preliminary data show the cells to be acceptable. Final testing has been delayed, but will be completed after approval of the preproduction test facilities has been received. The test procedures were given considerable attention during this period and they appear in the appendix to this report. A proposal for a life test program to be conducted during the production phase of the contract was submitted. This program is an attempt to establish failure modes of the detectors, and to learn more of their aging or storage characteristics. (Author)

AD-609 038 Div. 6, 12
OTS Prices: HC $6.00/MF $1.25

Pan American World Airways, Inc., Patrick AFB, Fla.
THE UDOP HANDBOOK.
Rept. for Mar 63-Jul 64, by Daniel L. Schneid. Jul 64, 214p
Contract AF08 606 5300
AFETR TR64 7
Unclassified report

Descriptors: (*Doppler radar, Handbooks), (*Doppler systems, Tracking), Ultrahigh frequency, Guided missile ranges, Doppler effect, Mathematical analysis, Electronic equipment, Data processing systems, Measurement, Theory.

The document contains a complete description of the UDOP (Ultra-High Frequency Doppler) System used on the Atlantic Missile Range. All phases of the effort involved when UDOP is called up to support a mission are included. The document explains the theory, equipment solutions, and mathematical techniques involved. (Author)

AD-609 091 Div. 6, 26
OTS Prices: HC $1.00/MF $0.50

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURE TO INVESTIGATE PROPERTIES OF INDIUM ANTIMONIDE AND TO PROVIDE 801-C6 INFRARED DETECTORS.
Quarterly progress rept. no. 7, 27 Jun-27 Sep 64, by Robert L. Smythe and William L. Kolander. 1964, 12p TI-03-64-77
Contract DA36 039AMC01463E, Proj. S4089
Unclassified report

See also AD-606 791.

Descriptors: (*Infrared detectors, Manufacturing methods), (*Indium alloys, Antimony alloys), Photoconductivity, Performance (Engineering), Production, Storage, Vacuum apparatus, Tests, Surface properties.

Twelve preproduction detectors were verbally approved and official notification to proceed into the production phase of the contract is being processed. The production pilot line facilities were physically relocated due to a reorganization, however, no modifications to processes are anticipated. Field-of-view studies were extended. Surface recombination experiments were conducted. High vacuum levels are still present in dewars stored for 3000 hours. (Author)

AD-609 212 Div. 6, 25
OTS Prices: HC $2.00/MF $0.50

Military Physics Research Lab., Univ. of Texas, Austin.
A COLLECTION OF PAPERS RELATIVE TO THE DESIGN AND DATA ANALYSIS OF THE PERSEAS SYSTEM,
by Robert G. Tull, Peter B. Brown, Hal B. Watson, Jr., and Herman E. Brown. 19 Dec 63, 32p MPRL-562
Contract AF08 635 3659
Unclassified report

See also AD-405 769.

Descriptors: (*Photoelectric effect, Optical equipment), (*Detectors, Optical equipment), (*Optical images, Detection), Photosensitivity, Light, Light pulses, Focusing, Azimuth, Lenses, Optical properties, Geometric forms, Design, Analysis.

In the paper 'On the General Field Illumination in the Focal Plane of A Camera Lens in Daylight,' an attempt is made to compute the illumination at the focal plane of a camera lens. With some assumptions made about the distance and power of a source whose image is to be detected, a ratio S/B (signal-to-background) is computed for the specific case in which the focal plane is scanned by a slit which admits a fraction of the total illumination to a photosensitive element. A paper 'A Comparison of Signal-to-Background Power for Changes in the Number of Slits, in the Number of Detectors, and in the Width and Length of the Slits in a Data Frame' extends the S/B power ratio, to include the basic design parameters of number of slits, number of detectors, and the dimensions of the slits. A paper 'Data Reduction for PERSEAS II' develops an expression to give the actual azimuth angle in PERSEAS coordinates in terms of the data available from the PERSEAS system. A paper entitled 'Intensity of Reflected Radiation From a Cone' deals with the optical reflection from a conically shaped object. An expression is obtained for the intensity of reflected radiation as a function of range.

AD-609 242 Div. 6, 5
OTS Prices: HC $2.00/MF $0.50

Philco Corp., Palo Alto, Calif.
STUDY OF ADAPTIVE PROCESSES APPLIED TO PHASE-LOCKED LOOPS.
Technical documentary rept. for 1 Jul 60-30 Jun 61, by J. Huylar, R. Lawhorn, and C. S. Weaver.

21 Dec 61, 44p WDL-TR-1693
Contract AF04 647 532

Unclassified report

See also AD-287 107, AD-408 920.

Descriptors: (*Phase-locked communication systems, Satellites (Artificial)), (*Adaptive communication systems, Phase-locked communication systems), Doppler systems, Tracking, Signal-to-noise ratio, Filters (Electromagnetic wave), Mathematical analysis.

The phase-locked loop is a form of FM detector that is being widely used in space communication systems. This is probably the circuit most responsible for the success of low-data rate extremely long-range space communication links. There are two important uses of phase-locked loops. One is as a Doppler tracking filter and the other is as a demodulator. The transfer function of the optimum tracking filter is a function of the rate of Doppler shift and the signal-to-noise ratio. If a form is assumed for the modulation the optimum filter is a function only of the signal strength. This report is a summary of the current progress of a study of adaptive phase-locked loops. Measurements of the rate of Doppler shift and/or signal strength are made automatically and the loop is adjusted to near optimum. The study is divided into two main parts. The first is primarily theoretical. It concerns the synthesis of the optimum filters when the measured data are known and the optimum means for taking the measurements. The second phase is an experimental study of the hardware.

AD-609 246 Div. 6, 28
OTS Prices: HC $2.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
EFFECTS OF DISPLAY POLARITY ON TARGET DETECTION WITH SIDE-LOOKING RADAR.
Final rept. for Jan-Jun 64,
by Barbara A. Van Ausdall and Herschel C. Self.
Oct 64, 41p
Proj. 7184, Task 718404
AMRL TR64 82

Unclassified report

Descriptors: (*Military psychology, Target recognition), (*Target recognition, Performance (Human)), (*Side-looking radar, Display systems), Detection, Radar equipment, Radar images, Brightness, Radar operators, Strategic air command, Tactical air command, Training, Performance tests, Probability, Statistical analysis, Correlation techniques.

This study examines the effects of display polarity on the performance of subjects searching for specific targets on a side-looking radar (SLR) display. SLR imagery was displayed on a 14 by 14 inch display at a scale of 1: 176,000 and at 950 knots simulated aircraft speed. Nineteen SAC and TAC radar navigators were randomly assigned to two groups. One group was tested on a positive copy and the other on a negative copy of the same film. The average subject on the positive display detected significantly more targets (38.4%) than the average subject (32.1%) on the negative display. Target detection times on the positive display were significantly shorter. There was no significant difference between groups in number of responses to nontarget objects. For detections the distributions of confidence judgments were not significantly different, however for nontarget objects the negative group was only half as likely to express high confidence that they were targets. For both types of display there were positive and significant correlations between maximum target dimension and probability of detection. When the large training bias favoring the positive group is considered, it appears unlikely that either polarity should be considered as definitely superior for systems applications. (Author)

AD-609 277 Div. 6, 5, 12
OTS Prices: HC $2.00/MF $0.50

Philco Corp., Palo Alto, Calif.
A HUMAN ENGINEERING DESCRIPTION OF THE INSTRUMENTATION FOR THE MAN-MACHINE INTERACTIONS WITHIN THE ANNETTE TRACKING STATION.
Technical operating rept.
23 Mar 62, 50p WDL-TR-1743
Contract AF04 647 829

Unclassified report

Descriptors: (*Human engineering, Command and control systems), (*Command and control systems, Satellites (Artificial)), (*Tracking, Systems engineering), (*Voice communication systems, Tracking), Instrumentation, Design, Specifications, Checkout equipment, Display systems, Control panels, Monitors, Doppler systems, Telemeter systems, Radar antennas, S band.

This report describes the human engineering effort required to develop a system concept into a design of the control-display subsystem and the required specifications for the voice communications subsystem meeting operational objectives for the Annette Tracking Station (ATS). (Author)

AD-609 400 Div. 6, 8
OTS Prices: HC $3.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
MODERN SPARK TRANSMITTER TECHNIQUES.
Final rept.,
by L. T. Dolphin, Jr. and A. F. Wickersham, Jr.
Dec 64, 58p
Contract Nonr4178 00, Proj. 4548, ARPA Order 463

Unclassified report

Rept on Proj. DEFENDER.

Descriptors: (*Pulse transmitters, Sparks), Rings, Electric discharges, Radiofrequency power, High frequency, Antenna radiation patterns, Parabolic antennas, Ultrahigh frequency, Antennas, Pulse generators, Radar signals, Design, Radar transmitters.

This report describes modern spark transmitter techniques, covering such areas as ring spark transmitter design, radiation patterns, experimentation, and possible applications of the ring spark transmitter. Synchronization of spark gap discharges is described, as is an investigation into spark gap pressurization. The report presents results of the study and indicates possible areas of development of the ring spark transmitter as a practical device for the generation of very high peak power in the high-frequency range. (Author)

AD-609 423 Div. 6, 12
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
PHOTOGRAPHIC TRACKING FOR HIGH ALTITUDE SATELLITES,
by J. Westman. 1958, 41p STL/TM-59-0000-00383

Unclassified report

Descriptors: (*Tracking, Satellites (Artificial)), (*Communication satellites (Active), Tracking cameras), (*Tracking cameras, Communication

satellites (Active)), Photography, Satellite attitude, Orbital trajectories, Errors, Corrections, High altitude, Illumination, Stars.

An extremely accurate method for the tracking of a satellite is investigated. This method involves the photographing of a satellite against a star background to determine its angular position. Because of certain natural restrictions which exist in this method of tracking, an analysis of the effects of such restrictions is presented in order to establish the suitability of photographic tracking for the six-hour polar communication satellite program. Photographic tracking information could be used for determining orbital corrections and for predicting future satellite positions in connection with this program. (Author)

AD-609 426 Div. 6, 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A TWO-STEP SEQUENTIAL PROCEDURE FOR IMPROVING THE CUMULATIVE PROBABILITY OF DETECTION IN RADARS,
by L. E. Brennan and F. S. Hill, Jr. Oct 64, 70p
RM-4338-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Radar pules, Sequential analysis), (*Detection, Probability), (*Target recognition, Probability), (*Radar, Search theory), Search radar, Phased arrays, Radar scanning, Radar targets, Radar antennas, Radar tracking, Ranges (Distance), Radar echo areas, Monopulse radar, Optimization, Iterative methods, Communication theory, Decision theory, Programming (Computers), Series, Bessel functions.

This Memorandum discusses a simple two-step search procedure for phased-array radars. The two-step procedure consists of illuminating each beam position in turn with a single transmitted pulse, and testing for the presence of a return signal from a target in each of m range positions. If the preset threshold is crossed in any range cell, a second higher-energy pulse (or train of pulses) is transmitted, a test is again performed on the return waveform, and a second threshold is used for comparison. If the second threshold crossing is observed in the same range cell, the decision is made that a target is present at that range. If the first threshold is not crossed, or if the first is crossed but the second is not, the decision is made that no target is present, and the next beam position is examined. Such a method is easily implemented in a phased-array radar, where the transmitting beam may be made to stop instantaneously (or return) when necessary to transmit the confirmation pulse. (Author)

AD-609 433 Div. 6
OTS Prices: HC $3.00/MF $0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
COORDINATE CONVERSION FOR THE HAYSTACK POINTING SYSTEM.
Group rept.,
by P. Stylos. 10 Dec 64, 64p LL-1964-71
Contract AF19 628 500
ESD TDR64 584

Unclassified report

Descriptors: (*Antennas, Tracking), (*Position finding, Antennas), (*Tracking, Antennas), Radar tracking, Astronomical geodesics, Celestial navigation, Numerical methods and procedures, Programming (Computers).

This report states the mathematics and describes the computer program used to convert inertial celestial coordinates to radar pointing angles, and vice versa, in the Haystack Antenna Pointing System. (Author)

7. Electrical Equipment

AD-608 973 Div. 7, 12
OTS Prices: HC $2.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
CEROLYTE FUEL CELL.
Quarterly technical progress rept. no. 3,
by D. H. Archer, E. F. Sverdrup, L. Elikan, and W. A. English. 10 Dec 64, 50p
Contract AF33 615 1425, Task 817303 17
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-607 146.

Descriptors: (*Fuel cells, Spacecraft), (*Power supplies, Fuel cells), Electric power production, Electrodes, Platinum, Bonding, Surface properties, Solids, Electrolytes, Ceramic materials, Zirconium compounds, Oxides, Voltage, Batteries and components, Performance (Engineering), Life expectancy, Hydrogen, Oxygen, Seals (Stoppers), Resistance (Electrical), Polarization, Yttrium compounds, Platinum alloys, Scandium compounds, Rodium alloys, Sintering, Failure (Mechanics).

A summary is given of the overall development program on the cerolyte fuel cell. A 50-watt generator was produced whose performance will be used in the design and systems evaluation of a 500-watt generator suitable for use in aerospace applications.

AD-608 984 Div. 7, 24
OTS Prices: HC $1.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
MILLIMICROSECOND TRIGGERING OF HIGH-VOLTAGE SPARK GAPS,
by G. A. Theophanis. 23 Sep 59, 23p
RAD-9-TM-59-52
Contract AF04 647 305, Proj. WS107A2
Unclassified report

Descriptors: (*Trigger circuits, Synchronizing switches), (*Synchronizing switches, Trigger circuits), Kerr cells, Electromagnetic pulses, Transformers, Pulse generators, High-speed photography, Sparks.

Pulse transformers are often employed in circuits which are used to trigger spark gaps. There are limitations in the use of this type of generator when a high degree of accuracy is desired. To operate large-area, high-power light sources with Kerr cell shutters for the photography of high-velocity particle impacts, synchronization of the light source and shutter must be accomplished with a jitter of no more than a few millimicroseconds. Pulse requirements and spark-gap conditions for millimicrosecond triggering are defined. Several transformerless, trigger-pulse generators are described. One of these has been used to trigger 50-kilovolt spark gaps with jitter times as low as 2 millimicroseconds. A number of techniques for synchronizing the firing of spark gaps are discussed, and some uses of these techniques are given. Several methods for pulsing Kerr cells using accurately triggered spark gaps are also described. (Author)

AD-608 998 Div. 7, 26
OTS Prices: HC $1.00/MF $0.50

Astron Corp., East Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR CAPACITOR VAPORIZED TEFLON, METALLIZED GLOW-DISCHARGED DEPOSITED DIELECTRIC FILM.
Quarterly rept. no. 7, 1 Jul-30 Sep 64,
by F. Heringer. 30 Sep 64, 14p
Contract DA36 039AMC01459E
Unclassified report

See also AD-605 536.

Descriptors: (*Fixed capacitors, Dielectric films), (*Dielectric films, Fixed capacitors), (*Capacitors, Manufacturing methods), Dielectric properties, Glow discharges, Soldering, Vapor plating, Halocarbon plastics, Polyethylene plastics, Plastic coatings.

The latest procedures developed, that is testing of the section prior to spraying the ends, testing and breakdown of the section after spraying, and soldering using hand iron with very careful control of temperature was followed in order to obtain the greatest maximum number of good units. It was found that sealing in the cans, that is the soldering of the glass end seals into the can after the insertion of the capacitor sections, was also a very critical operation since there was sufficient heat transfer from the soldering operation to the section to affect the contact resistances of the end connection. However, a sufficient number of units was obtained to permit continuation of the testing. Not all of the units met the exact requirements of the Specification. However, it was thought worthwhile to select the best units for the continuation of the testing.

AD-609 051 Div. 7, 12, 14, 25
OTS Prices: HC $7.00/MF $1.75

Montsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC RESEARCH.
Final technical report for 15 Sep 63-30 Oct 64,
by C. M. Henderson, R. G. Ault, E. R. Beaver, D. H. Harris, and W. H. Hedley. 15 Dec 64, 317p
Contract AF33 615 1084, Proj. 8173, Task 817302 9
APL TR64 135
Unclassified report

See also AD-422 854, AD-427 285, AD-437 280.

Descriptors: (*Thermoelectricity, Power supplies), (*Power supplies, Aerospace craft), (*Generators, Thermoelectricity), High-temperature research, Electric power production, Power, Temperature, Solar radiation, Radioactive isotopes, Nuclear reactors, Manufacturing methods, Performance (Engineering), Bonding, Materials, Coatings, Test methods, Energy conversion.

Nominal 50-watt (e) and 15-watt (e) laboratory model generators were designed, fabricated and subjected to sustained and thermal cycling tests at a hot-junction temperature of about 1200C, and cold junctions of about 570C in a vacuum of 10-5 - 10-6 torr. Both generators, constructed of solid-state, bonded, segmented, p- and n-type thermoelements showed good resistance to degradation under these conditions. Improvements in the properties of thermoelectric materials and interface bonding techniques for thermoelements were achieved to yield p-n couples with 17% higher performance, relative to 1962-63 couples. Nuclear reactor, radioisotope, and solar-heated, high-temperature, thermoelectric, space-powered system concepts were proposed and preliminarily investigated. These studies showed that high-temperature, (1200C) thermoelectric space-type power units, ranging in size from a few watts to several hundred KW output, can be designed for performances from 335 lbs./KW(e) for a solar-concentrating type system to 15 lbs./KW(e) for 350 KW(e) or larger space power systems utilizing fast-reactor heat sources.

AD-609 098 Div. 7, 12, 14, 17, 27
OTS Prices: HC $3.00/MF $0.75

Aerospace Corp., Los Angeles, Calif.
APPLIED RESEARCH PROGRAMS ABSTRACT BULLETIN, FLIGHT VEHICLE POWER AND MATERIALS, VOLUME II, PART I, ABSTRACTS 2-122 THROUGH 2-207,
by K. B. Andrews, N. B. Crow, M. S. Hicks, E. Moore, and E. H. Smith. Aug 62, 73p
TDR-930(2701-01)TN-1, vol. 2, pt. 1, no. 2
Contracts AF04 647 930, AF04 695 169
DCAS TN61 3 V2 P1 No2

Unclassified report

Descriptors: (*Materials, Spacecraft), (*Power supplies, Spaceborne), Abstracting, Indexes, Fuel cells, Batteries and components, Magnetohydrodynamics, Nuclear energy, Nuclear industrial applications, Solar cells, Thermionic converters, Thermoelectricity, Metallurgy, Refractory materials, Polymers, Composite materials, Magnetic materials, Fluids, Lubricants, Manufacturing methods.

Contents: Chemical sources of energy; Magnetohydrodynamic systems; Mechanical devices; Nuclear sources of energy; Solar sources of energy; Thermionic devices; Thermoelectric devices; Metallurgy; Refractory materials; Polymeric and composite materials; Electric, electronic, and magnetic materials; Fluids and lubricants; Fabrication techniques and processes.

AD-609 155 Div. 7
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ALTERATION OF THE MECHANISM OF A MULTIMETER SPARK BY THE ARTIFICIAL INTRODUCTION OF A VOLUMETRIC CHARGE IN THE INSULATING INTERVAL,
by E. M. Bazelyan and I. S. Stekol'nikov.
6 Oct 64, 14p
FTD TT64 775; TT 65 60455

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Doklady, 1964, v. 155, no. 4, p. 784-787.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-274 062.

Descriptors: (*Sparks, Voltage), (*Electric discharges, Voltage), (*Electrical corona, Voltage), (*Electric arcs, Voltage), Electrodes, USSR.

AD-609 204 Div. 7, 4, 26
OTS Prices: HC $2.00/MF $0.50

National Cash Register Co., Dayton, Ohio.
INVESTIGATION OF CHEMICALLY SPRAYED THIN-FILM PHOTOVOLTAIC CELLS.
Quarterly rept. no. 2, 15 Aug-14 Nov 64,
by R. R. Chamberlin and J. S. Skarman. 14 Nov 64, 36p
Contract AF33 615 1578, Proj. 8173, Task 817301

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Solar cells, Manufacturing methods), (*Photoelectric cells (Semiconductor), Manufacturing methods), (*Semiconducting films, Sulfides), Copper compounds, Cadmium compounds, Sprays, Bronze, Steel, Test facilities, Complex compounds.

The report discusses the details of the chemical spray deposition technique that was used for the deposition of the CdS and Cu sub x S sub y semiconductor films. Topics include film deposition techniques, film studies, cell fabrication, and test installation.

AD-609 311 Div. 7, 25
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Bloomfield, N. J.
DEVELOPMENT OF INFRARED SOURCES.
Quarterly progress rept. no. 2 15 Aug-30 Nov 64,
by N. C. Beese. 30 Nov 64, 8p
Contract NObsr91099

Unclassified report

Descriptors: (*Xenon lamps, Manufacturing methods), (*Infrared lamps, Xenon lamps), Infrared equipment, Electromagnetism, Actuators, Electric arcs, Electrodes, Coatings, Tantalum compounds, Carbides, Molybdenum, Oxidation, Electrical equipment, Feasibility studies, Infrared research.

An engineering-research development program outlined in the preceding report (AD-608 530) and which involved the study of various lamp structures having minimum overall length was continued during this quarter. Some preliminary work was done on the possible use of an electromagnetic device to start these lamps on 100 volt supply. Several high intensity short-arc xenon lamps were constructed similar to those designed for use in the omnidirectional marine lantern made several years ago, but the overall length was reduced about six inches. One lamp was burned 50 hours with no observable deterioration. (Author)

AD-609 387 Div. 7, 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
CURRENT-MEASURING DEVICES USED WITH THE SUPER-FAST PINCH ASSEMBLY,
by Stanley L. Leonard. 15 Jan 59, 13p
STL-TR-59-0000-00571
Contract AF04 647 309

Unclassified report

Descriptors: (*Coils, Measuring devices (Electrical and electronic)), (*Resistors, Measuring devices (Electrical and electronic)), (*Measuring devices (Electrical and electronic), Magnetic pinch), Solenoids, Calibration, Ammeters.

It was early recognized that the magnitude of the discharge current in this assembly is an important parameter and several current-measuring devices were built. In addition, methods were developed for checking the calibration of these current-measuring devices in the required range of 20 - 100 kiloamperes at 17 megacycles. For current measurement, solenoidal and toroidal coils were used, and they were calibrated against either a two-turn coil or a shunt. Good agreement was obtained among the current values indicated by the various current-measuring coils and by the two calibrating devices. In the report, the various coils and the shunt are described and a summary of the results is given.

AD-609 395 Div. 7
OTS Prices: HC $2.00/MF $0.50

Burndy, Norwalk, Conn.
PRODUCTION ENGINEERING OF TRIAXIAL PULSE CONNECTORS.

Consolidated rept. for 16 Dec 62-30 Sep 64,
by Maxwell E. Peel. 30 Sep 64, 36p
Contract DA36 039SC85964

Unclassified report

Descriptors: (*Electric connectors, Pulse cables), Design, Electric insulation, Degradation, Electrical corona, Performance (Engineering), Manufacturing methods, Tests.

Engineering Samples of the UG1292()/U and UG1291()/U Connector assemblies were tested and evaluated. Certain modifications to the design are necessary to assure proper termination of the first shield, to assure proper elimination of air voids at the mating surfaces. Engineering Samples of the UG1296()/U, P-230 and P-190 connector assemblies were tested and evaluated. Corona characteristics after temperature cycling indicated a degree of degradation of the cable has taken place. This was quite apparent relative to the RG230/U cable. (Author)

AD-609 415 Div. 7, 4, 19, 25
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
DIRECT ENERGY CONVERSION SYSTEMS.
Quarterly technical summary rept. no. 4, 1 Jun-31 Aug 64,
by Robert H. Eustis. 30 Sep 64, 98p
Contract AF49 638 1123, ARPA Order 246
NP 14538

Unclassified report

Descriptors: (*Energy conversion, Magnetohydrodynamics), (*Magnetohydrodynamics, Energy conversion), (*Fuel cells, Energy conversion), Generators, Electrodes, Materials, Water, Cooling, Electric currents, Electric insulation, Fluid flow, Plasma medium, Boundary value problems, Reaction kinetics, Shock tubes, Chemisorption, Heat transfer, Transport properties, Boundary layer.

The MGD generator electrode materials problem has been greatly simplified by introducing cooling water into the electrode stems. Runs of over one-half hour duration indicate a negligible recession of the surface so that the same electrodes can be used for several runs. Electrical data from the generator indicates a diffuse current with an applied electric field for currents up to about 10 amperes per electrode (current density of about 1 amp/sq cm). Current leakage through the insulating brick has been examined and some changes in brick design and material are being made to reduce this leakage. A more complete report than that previously given is made of the investigation of the influence of the Ramsauer effect on nonequilibrium electron temperatures. The calculation of electrical conductivity by the Chapman-Enskog method has been compared to the method of Frost.

AD-609 424 Div. 7, 25
OTS Prices: HC $3.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
ELECTRON BOMBARDMENT OF SILICON SOLAR CELLS,
by R. G. Downing. 24 Feb 60, 52p
STL/TR-60-0000-04057, STL/EM-10-5

Unclassified report

Descriptors: (*Solar cells, Electron bombardment), (*Radiation damage, Solar cells), Silicon, Photoelectric cells (Semiconductor), Semiconductors, Quartz, Glass, Shielding, Crystal lattice defects, Heat treatment, Semiconductor devices, Satellites (Artificial), Spacecraft, Graphics.

Silicon solar cells were irradiated with 500 kev electrons to determine the effect of electron radiation similar to that encountered in satellites on the efficiency of solar cells. The experiments show that an integrated flux of about 5 x 10 to the 13th power e/sq cm reduces silicon solar cell efficiency by about 25 percent. Additional experiments using quartz and glass shielding for radiation protection show the suitability of reducing the radiation damage by this technique. Combining the experimental results with the simple theory, 0.065 in. of quartz or glass are indicated as necessary to provide protection from 800 kev electrons in the trapped radiation bands. Additional protection of shielded silicon solar cells will result from annealing of radiation induced defects at a low rate near room temperatures. No quantitative data on annealing was obtained from these experiments, but this effect should be regarded as a subject for further investigation in addition to detailed investigation of radiation damage in silicon solar cells. (Author)

8. Electronics and Electronic Equipment

AD-608 920 Div. 8
OTS Prices: HC $2.00/MF $0.50

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
CESIUM VAPOR CATHODE STUDY,
by A. L. Eichenbaum, F. H. Norman, and H. Sobol.
Sep 64, 45p
Contract AF30 602 3241, Proj. 5573, Task 557303
RADC TDR64 319
Unclassified report

Descriptors: (*Cesium electron tubes, Cathodes (Electron tubes)), (*Cathodes (Electron tubes), Cesium), Plasma medium, Vapors, Electron guns, Silver compounds, Chlorides, Gas seals, Electron beams, Liquid metals.

The objective of this contract is to develop cesium-plasma cathodes and guns capable of yielding stable electron beams with current densities of 100 A/sq cm or higher and to investigate the utility of such beams for tube applications. Stable kilovolt electron beams with current densities up to 800 A/sq cm were extracted from a cesium-vapor tungsten hollow cathode. A highly directed vapor flow was provided along the cathode surface and away from the electron exit aperture. This permitted the application of extraction voltages from zero to 1.2 kV without gas breakdown or oscillations. Several other tubes are being designed using the directed cesium-vapor feed. Two tubes are being designed for studies of long, magnetically confined beams which are extracted from hollow cathodes. Another tube utilizes cesium feed through an ionizing porous tungsten anode; an L-cathode opposite the anode provides the electrons. Current extraction from the plasma takes place through an aperture in the anode. A silver chloride ring was successfully employed as a demountable seal in a cesium-vapor tube. Work on such seals and on hydrogen removal from commercial cesium was carried out to allow the construction of the needed test tubes.

AD-608 922 Div. 8
OTS Prices: HC $2.00/MF $0.50

Raytheon Co., Burlington, Mass.
X-BAND ELECTROMAGNETIC AMPLIFYING LENS.
Rept. for 25 Feb-25 May 64,
by J. Skowron and N. Heenan. Oct 64, 28p
Contract AF30 602 2892, Proj. 5573, Task 557303
RADC TDR64 321
Unclassified report

Descriptors: (*Microwaves, Amplifiers), (*X band, Electromagnetic lenses), (*Electromagnetic lenses, X band), Microwave amplifiers, Theory, Experimental data, Manufacturing methods, Millimeter waves, Electrodes, Water, Cooling, Waveguides, Electron tubes, Microwave frequency, Electrical impedance, Design, Diodes (Electron tubes).

This report covers the work done during the period February 25, 1964 through May 25, 1964, under Contract No. AF30(602)-2892, to build and evaluate an experimental Electromagnetic Amplifying Lens (EAL) at X-band which will demonstrate the practicality of the EAL principle, and to carry out a theoretical and experimental investigation of fabrication techniques and tube components necessary for the embodiment of the EAL principle in a practical super power millimeter wave oscillator or amplifier. During the sixth quarter, the EAL was reassembled. The new tube incorporates a water cooled anode and two water cooled cathodes, and the whose assembly is such that the anode-cathode spacing for both cathodes is everywhere uniform to within 1% or better. Additional work has been conducted on the construction of bi-uniform millimeter-wave structures using the multi-blade machine. (Author)

AD-608 930 Div. 8
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Los Angeles, Calif.
APPLIED RESEARCH ON EFFICIENCY IMPROVEMENT IN O-TYPE TRAVELING-WAVE TUBES.
Interim engineering rept. no. 1, 15 Jun-15 Oct 64,
by O. Sauseng. Nov 64, 57p
Contract AF33 615 1951, Proj. 4156, Task 415603
Unclassified report

Descriptors: (*Traveling-wave tubes, Synchronization (Electronics)), (*Electron beams, Traveling-wave tubes), Circuits, Electron guns, Test equipment (Electronics), Radiofrequency power, Performance (Engineering), Digital computers, Electrical impedance, Voltage, Velocity, Gain.

Methods to improve the synchronism of the large signal beam modulation with its circuit wave, of traveling-wave amplifiers were investigated. One approach of interest here is to reduce the phase velocity of the circuit near the output end in one or two steps. (One and two step velocity taper). The other scheme considered is to increase the beam velocity by applying a higher voltage to the output section of the circuit (voltage jump). Both methods were analyzed with a one dimensional large signal digital computer program for a specific set of tube parameters. A substantial improvement of the efficiency (up to 62% and 66%) is indicated, when the design parameters are optimized. The demountable station was modified to facilitate a quick experimental evaluation of these schemes. The performance of the apparatus was evaluated. The test circuit properties are being determined. (Author)

AD-608 934 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

CTS Corp., Elkhart, Ind.
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE, TRANSISTOR TYPE POTENTIOMETERS.
Quarterly progress rept. no. 13, 1 Jul-30 Sep 64,
by C. L. Holmes and D. C. Kinsey. 30 Sep 64, 16p
Contract DA36 039SC85976
Unclassified report

See also AD-603 943.

Descriptors: (*Potentiometers, Manufacturing methods), (*Subminiature electronic equipment, Potentiometers), Transistors, Reliability (Electronics), Failure (Mechanics), Life expectancy, Moisture, Performance (Engineering), Tests.

Preproduction testing of 1800 samples of two styles of the subminiature potentiometers resulted in failures only on Visual and Mechanical inspection, rotational life, and moisture resistance. 1600 samples of both styles are being rebuilt for retesting to demonstrate compliance with the technical requirements of the contract. A revised time schedule has been resubmitted for the completion of the contract. 2400 units continue on the 10,000 hour load life reliability study and have completed 7,000 hours for a total of 16,800,000 unit hours. (Author)

AD-608 942 Div. 8
OTS Prices: HC $3.00/MF $0.75

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
FREQUENCY MODULATION NOISE.
Research rept.,
by John T. Frankle. 31 Aug 64, 70p
PIBMRI-1041-62
Grant AF AFOSR62 295
AFOSR 4504
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Noise (Radio), Frequency modulation), Radio receivers, Intermediate frequency, Signal-to-noise ratio, Theory, Measurement, Mathematical analysis, Statistical processes.

The noise characteristics of a commercial FM receiver were determined experimentally and compared with the theoretical results of Middleton and Stumpers. The theoretical solutions are derived on the basis of both gaussian and rectangular receiver IF characteristics. The experimental results follow the rectangular solution for low carrier to noise ratio and the gaussian solution for high carrier to noise ratio. This is explained by the characteristics of the receiver and FM noise theory. A novel technique, employing an envelope detector, is used to measure carrier to noise ratio prior to the FM detector. The thesis also includes information helpful in consolidating the FM noise theory in the literature.

AD-608 950 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Lansdale Div., Philco Corp., Pa.
RESEARCH AND DEVELOPMENT TO OBTAIN SEMICONDUCTOR DIODES FOR ELECTRONIC TUNING.
Interim engineering rept. no. 5, 27 Jun-26 Sep 64.
26 Sep 64, 47p Philco-R-182
Contract NObsr89508, Proj. SR0080301, Task 9351
Unclassified report

See also AD-605 497.

Descriptors: (*Diodes (Semiconductor), Tuning devices), (*Tuning devices, Diodes (Semiconductor)), (*Avalanche diodes, Processing), Electronic equipment, Electrical properties, Semiconductors, Voltage, Etched crystals, Epitaxial growth, Silicon, Silicon compounds, Dioxides, Hydrochloric acid.

The devices required are being made by planar epitaxial silicon technology, with diffusion of a heavily-doped p-type region into an n-type layer on an n+ substrate. Additional studies were made of the factors influencing avalanche breakdown at the Si-Si 2 interface of large-area planar diodes, and additional devices were fabricated using techniques which result in a lower electric field in reverse-biased junctions. Analysis indicates that the guard-ring structure, plus the use of HCl etching immediately prior to epitaxial growth, improved photolithographic techniques, and gettering increase the yield of large-area planar diodes with breakdown voltage > or = 200 V. The over-all yield of diodes meeting the Device 'B' specification in every respect was approximately 9% during the latter part of the pilot production period. The principal problem was attaining the 200-V breakdown voltage. The median electrical characteristics of the in-specification devices were significantly better than required in the case of Q and log C vs. log V slope, and appreciably better than required in the case of I sub R. It was demonstrated that the log C vs. log V slope could be improved by modification of the diffusion depth of the main region of the diodes, a procedure which can be done with the guard-ring structure without adversely affecting the breakdown voltage level.

AD-608 959 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Bendix Corp., Southfield, Mich.
EXPLORATORY DEVELOPMENT OF THE Q-FACTOR TECHNIQUE.
Quarterly progress letter no. 1 for period ending 30 Jun 64,
by Max Frank. 10 Jul 64, 71p RLD-2645
Contract AF29 601 6316, Proj. 4400
Unclassified report

Descriptors: (*Transistors, Radiation damage), Silicon, Gamma rays, Gain, Degradation, Neutron spectrum, Gamma-ray spectra, Radiation measurement systems.

The Q-factor technique is a method of describing bipolar transistor gain as a function of the radiation exposure of the device. The ultimate goal of the Q-factor approach is to provide an accurate means of predicting transistor gain as a function of radiation type for various temperature, operating, and measurement conditions. To achieve this objective, this program is planned as an experimental-analytical effort to screen and identify the qualitative influences of the intermixed variables. The experimental phase will consist of a series of gamma and two nuclear reactor tests with X-irradiation used to assist in separating surface and bulk damage effects. Results are presented of two gamma radiation tests performed to study gain degradation of the 2N1613 and 2N2378 silicon transistors under various operating and measurement conditions. The damage is analyzed using the Q-factor technique of series testing and linear damage variations with flux. Base transit time measurements are used to correlate differences in gain damage rates with differences in base geometry and doping between transistors of the same type. The damage constants derived from the radiation tests were found to be dependent upon the particular set of irradiation and measurement conditions employed. (Author)

AD-608 960 Div. 8, 20, 25
OTS Prices: HC $2.00/MF $0.50

Bendix Corp., Southfield, Mich.
EXPLORATORY DEVELOPMENT OF THE Q-FACTOR TECHNIQUE.
Monthly progress letter rept. no. 1 for Feb 64,
by Max Frank. 10 Mar 64, 29p RLD-2557
Contract AF29 601 6316, Proj. 4400
Unclassified report

Descriptors: (*Transistors, Gain), (*Radiation damage, Transistors), Neutrons, Gamma rays, X-rays, Surface properties, Temperature, Test methods.

The Q-factor technique is a method of describing bipolar transistor gain as a function of the radiation exposure of the device. The ultimate goal of the Q-factor approach is to provide an accurate means of predicting transistor gain as a function of radiation type for various temperature, operating, and measurement conditions. An experimental-analytical effort is made to screen and acquire the qualitative influences of the intermixed variables. The experimental phases consists of a series of gamma and two nuclear reactor tests with X-irradiation used to assist in separating surface and bulk damage effects.

AD-608 961 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Bendix Corp., Southfield, Mich.
EXPLORATORY DEVELOPMENT OF THE Q-FACTOR TECHNIQUE.
Quarterly progress letter no. 2 for period ending 30 Sep 64,
by Max Frank. 10 Oct 64, 47p RLD-2734
Contract AF29 601 6316, Proj. 4400
Unclassified report

See also AD-608 959.

Descriptors: (*Transistors, Radiation effects), Silicon, Gamma rays, Gain, Degradation, Neutron spectrum, Gamma-ray spectra, Radiation measurement systems.

The effort in geometry normalization was extended by determining base transit times for very high current injection and examining transistor types other than the 2N1613. Temperature and current dependencies, operating and measurement, were investigated during two gamma tests and a neutron test. Irradiations were made on 2N1613 type transistors in the gamma and neutron tests, while the 2N709 and 2N914 were also tested in the neutron environment. The results of the two gamma tests and the experiment relating to active-passive irradiation conditions in the neutron test are described.

AD-608 962 Div. 8, 20, 25
OTS Prices: HC $1.00/MF $0.50

Bendix Corp., Southfield, Mich.
EXPLORATORY DEVELOPMENT OF THE Q-FACTOR TECHNIQUE.
Progress letter rept. no. 7, for Oct 64,
by Max Frank. 11 Nov 64, 5p RLD-2778
Contract AF29 601 6316, Proj. 4400
Unclassified report

Descriptors: (*Transistors, Gain), (*Radiation damage, Transistors), Neutrons, Gamma rays, X-rays, Temperature, Tests.

AD-608 978 Div. 8
OTS Prices: HC $1.00/MF $0.50

Harry Diamond Labs., Washington, D. C.
ETCHING CIRCUITRY ON METALLIZED ANODIZED ALUMINIUM,
by Emma Lee Hebb. 15 Oct 62, 12p
Proj. 96392
HDL TM62 77
Unclassified report

Descriptors: (*Circuits, Photoengraving), (*Photoengraving, Circuits), Aluminum, Coatings, Oxidation, Aluminum compounds, Oxides, Films, Cladding, Nickel, Copper, Electroplating, Resistance (Electrical), Thermal conductivity, Thermoelectricity, Temperature control, Semiconductors.

This report describes a method of preparing etched circuitry on metallized anodized aluminum and its use in fabricating parts for a thermoelectric temperature-control device. The method comprised anodization of type 52S aluminum, dual metal cladding with electroless nickel and electroplated copper, and photoetching of the desired circuitry on the anodized aluminum. Satisfactory adhesion of the metal conductors, high insulation resistance, and good thermal conductance of the thin anodized layer resulted in an excellent thermoelectric temperature device, and suggested other as yet unattempted applications. (Author)

AD-608 980 Div. 8
OTS Prices: HC $3.00/MF $0.75

Aerospace Technology Div., Library of Congress, Washington, D. C.
SPECIFICATIONS OF SOVIET PHOTOMULTIPLIER TUBES: SUMMARY OF DATA.
18 Nov 64, 83p
ATD P64 63; TT 65 60419
Unclassified report

Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Photomultipliers, Specifications), (*Electron tubes, Photomultipliers), Photocathodes, Voltage, Electron multipliers, Electromagnetic waves, Temperature, Vibration, Acceleration, Gamma rays, Optics, Stability, Performance (Engineering), Cathodes (Electron tubes), USSR.

The report contains a listing of technical specifications of serially manufactured Soviet photomultiplier tubes designed principally as experimental equipment for physics research.

AD-608 987 Div. 8
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTIC SOLUTION FOR STATISTICAL PROPERTIES OF ANTENNA GAIN PATTERNS PERTURBED BY LARGE PHASE ERRORS,
by Marvin Blum. Dec 64, 32p P-3024
Contract AF33 657 9540
Unclassified report

Descriptors: (*Phased arrays, Antenna radiation patterns), (*Antenna radiation patterns, Gain), (*Phase (Electronics), Errors), Probability, Monte Carlo method, Electromagnetic pulses, Mathematical analysis, Airborne, Matrix algebra, Vector analysis, Perturbation theory, Statistical distributions.

The analysis considers the effect of large random phase errors on the antenna pattern of a focused synthetic linear array. Statistical features of the gain pattern such as the moments and probability distribution are derived analytically for certain special cases but with no restriction on the size of the phase error, so that the results obtained can be used as a partial substitution and guide for the Monte Carlo technique. One special case considered is when the phase error vector has a multidimensional normal probability distribution with known covariance matrix. In the case of the independent phase errors the moments and probability distribution of the gain pattern are derived for large numbers (N) of pulses. In the normal case exact expressions for the moments of the gain pattern are derived. Under mild assumptions on the asymptotic distribution (large N) of a function of the phase errors, the distribution of the gain pattern and simplified equations for the moments of the gain pattern are obtained. (Author)

AD-608 997 Div. 8
OTS Prices: HC $2.00/MF $0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.

POINTING ERRORS IN SIMULTANEOUS LOBING ANTENNA SYSTEMS,
by Cecil L. Wilson. Mar 62, 40p
Proj. 503 05 023
BRL TN1453

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Antenna lobes, Direction finding signals), (*Direction finding signals, Errors), Monopulse radar, Targets, Parabolic antennas, Radar signals, Reflection, Phase shift, Antenna radiation patterns.

Pointing errors occur in monopulse systems when the geometry of operation is such that the ground between the system and target is illuminated. This analysis was made to determine the magnitude and form of these errors in a particular system operating under specified conditions. (Author)

AD-609 007 Div. 8, 25, 26
OTS Prices: HC $4.00/MF $1.00

Keystone Controls Corp., Newark, N. J.
PRODUCTION ENGINEERING MEASURE. CRYSTAL UNIT, TYPE CR-(XM-28)/U.
Final rept. for Jan 59-Jul 64,
by James M. Ronan. Jul 64, 122p
Contract DA36 039SC81275

Unclassified report

Descriptors: (*Crystals, Semiconductor devices), (*Crystal holders, Manufacturing methods), Design, Quartz, Diodes (Semiconductors), Test methods, Glass seals, Shock resistance Aging (Materials), Performance (Engineering), Cleaning, Bonding, Electrical conductance, Mechanical properties, Quality control, Specifications, Measuring devices (Electrical and Electronic), Resistance (Electrical), Capacitance, Electric shunts, Vibration.

The FINAL REPORT presents a condensed summary of all work accomplished on the PEM Contract from January, 1959 to July, 1964. The Summary includes a review of the technical problems encountered and an analysis of test results achieved in the Pilot Run. The report consists of three parts: History of the PEM Study, Process Manual and Quality Control Manual. Part I contains detailed descriptions and supporting data on problems encountered in the development of a suitable source of glass holders and sealing equipment, related crystal processing, test results achieved in the Pilot Run, and an analysis of the Aging study. Part II is the Process Manual. Material, equipment, yield figures and operational descriptions are included on all processes employed in the Pilot Run. Part III consists of the Quality Control and Inspection Manual. In format, the Manual has been prepared in accordance with recommended procedures outlined in Part III of 'SIGSIP No. 3007 (SPL)' dated 1 October 1955. The Manual outlines Quality Control and Inspection Techniques which were applied to the Pilot Run.

AD-609 009 Div. 8
OTS Prices: HC $1.00/MF $0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
POINTING ERRORS IN SEQUENTIAL LOBING ANTENNA SYSTEMS,
by Cecil L. Wilson. May 62, 25p
Proj. 503 05 023
BRL TN1463

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Antenna lobes, Direction finding signals), (*Direction finding signals, Errors), Monopulse radar, Targets, Parabolic antennas, Radar signals, Reflection, Phase shift, Antenna radiation patterns.

Angular pointing errors are introduced in sequential lobing antenna systems by reflection from the ground between the antenna system and the target. This theoretical analysis of a particular system operating under certain specified conditions was conducted to determine the magnitude and character of these errors and provide a basis for comparison with other types of antenna systems. A number of graphs showing the results of this study are included in this report. (Author)

AD-609 011 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
MILLIMETER WAVE COMPONENT DEVELOPMENT (BEAM-PLASMA AMPLIFIER).
Technical note no. 6, 21 Jun-20 Aug 64,
by Paul Chorney, Richard J. Madore, and Grant E. St. John.
Nov 64, 35p
Contract AF30 602 2948, Proj. 5573, Task 557304
RADC TDR64 446

Unclassified report

See also AD-608 616.

Descriptors: (*Millimeter waves, Microwave amplifiers), (*Plasma medium, Measurement), (*Microwave amplifiers, Millimeter waves), (*Electron beams, Plasma physics), Microwave equipment, Waveguides, Density, Test equipment (Electronics), Gas discharges, Probes (Electromagnetic), Tuning devices, Standing wave ratios, Waveguide couplers, Electrical properties, Plasma medium, Xenon, Electric currents, Microwave networks.

A summary is given of the plasma testers built to date. Plasma density measurements are described on a plasma tester with small diameter cathodes. The results of an experiment using two Langmuir probes are also discussed. The theory of the PIG discharge is supplemented by studies of the losses, electric field and the potential distribution in the discharge. The progress to date on the 2 mm BPA study vehicle is outlined along with a description of modifications to be made. The performance of the waveguide components was improved by several measures resulting in acceptable values of VSWR and insertion loss. (Author)

AD-609 012 Div. 8
OTS Prices: HC $2.00/MF $0.50

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
THE CIRCULAR LOOP ANTENNA NEAR THE INTERFACE BETWEEN A CONDUCTING MEDIUM AND AIR.
Scientific rept. no. 7,
by Keigo Iizuka. 10 Apr 64, 31p
Contract AF19 604 7262; Grant NSF G20225,
Proj. 7661, Task 76615
AFCRL 64 671

Unclassified report

See also AD-603 634.

Descriptors: (*Loop antennas, Experimental data), (*Antenna configurations, Experimental data), Admittance, Electric currents, Electrical conductance,

Antenna radiation patterns, Electromagnetic fields, Air.

The behavior of a circular loop antenna near the interface between a conducting medium and air has been studied experimentally in terms of the following several parameters: (1) circumference per wavelength beta(b) of the loop, (2) loss tangent of the conducting medium, (3) depth of the loop below the interface, and (4) angle between the plane of the loop and the interface. The measured quantities were compared with the corresponding ones for a loop in a homogeneous dissipative medium of infinite extent wherever possible. Comparisons were made of the behavior of a loop when oriented both parallel to the interface and perpendicular to it in terms of such quantities as the driving-point admittance, the amplitude and phase distributions of the current, the effect of varying the distance from the interface, and the upward transmission of power into air from the loop when immersed in the conducting solution. (Author)

AD-609 014 Div. 8, 2, 5
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 3. RADIO PHYSICS.
Quarterly progress rept. for 1 Aug-31 Oct 64.
15 Nov 64, 15p
Contract AF19 628 500
ESD TDR64 576

Unclassified report

See also AD-296 492.

Descriptors: (*Space surveillance systems, Radar tracking), (*Radio astronomy, Instrumentation), (*Atmospherics, L band), Tracking, Detection, Satellites (Artificial), Astrophysics, Ionospheric propagation, Aurorae, Electromagnetic wave reflections, Rainfall, Solar radiation, Radio equipment, Radar equipment, Antennas.

Contents: Space surveillance, Radio and radar astronomy, Ionospheric and auroral studies, Station equipment and improvements, Solar radar studies, Propagation studies.

AD-609 027 Div. 8
OTS Prices: HC $1.00/MF $0.50

Stanford Electronics Labs., Stanford Univ., Calif.
BIBLIOGRAPHY OF TECHNICAL REPORTS ISSUED BY STANFORD ELECTRONICS LABORATORIES DURING 1960.
1960, 12p

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Bibliographies, Electronics), (*Electronics, Bibliographies), Electronics laboratories, Control systems, Circuits, Communication theory, Masers, Parametric amplifiers, Transistors, Ionospheric distrubances, Ionospheric propagation, Antennas, Electronic equipment, Plasma physics, Subject indexing.

Contents: Control systems, information and circuit theory; Electron devices and directly associated circuits; Masers and parametric amplifiers; Transistors and other solid state devices; Radioscience: ionosphere studies, and antennas; Systems techniques; Equipments and subcomponents; Plasmas.

AD-609 029 Div. 8, 12
OTS Prices: HC $2.00/MF $0.50

Martin-Marietta Corp., Denver, Colo.
VOLTAGE BREAKDOWN IN IONIZED AIR AT FREQUENCIES FROM ZERO TO 10,000 MEGACYCLES,
by W. H. Hayt, Jr., H. J. Heim, and R. H. George.
30 Apr 59, 36p
Contract AF04 645 56

Unclassified report

Subcontracted to Purdue Univ., Lafayette, Ind. Engineering Experiment Station.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Guided missile antennas, Plasma medium), (*Electric discharges, Experimental data), (*Sparks, Ionization), (*Plasma medium, Electric discharges), Frequency, High Frequency, Very high frequency, Ultrahigh frequency, Microwave frequency, Barometric pressure, Electromagnetic pulses, Voltage, Electrodes, Separation, Electric fields, Cobalt, Measurement, Test methods, Cavity resonators, Gas ionization.

A need arose for experimental data which would enable more exact design of surface-mounted antennas on missiles which would avoid corona and voltage breakdown in the higher atmosphere. A contract was initiated to obtain (1) a literature search and (2) experimental data covering voltage breakdown in air as a function of pressure, frequency, pulse length, electrode spacing, and degree of ionization.

AD-609 047 Div. 8
OTS Prices: HC $3.00/MF $0.75

Ford Instrument Co., Long Island City, N. Y.
RESEARCH STUDIES IN THE ROLE OF ADDITIVES IN THE LOW TEMPERATURE CESIUM DIODE.
Final rept.,
by L. Haring and G. Grimm. Aug 64, 57p
Contract AF19 628 2983, Proj. 6694, Task 669409
AFCRL 64 722

Unclassified report

Descriptors: (*Diodes (Electron tubes), Cesium), (*Cesium electron tubes, Thermicons), (*Thermicons, Cesium electron tubes), (*Additives, Cesium electron tubes), Energy conversion, Thermionic emission, Vapors, Gases, Neon, Argon, Tungsten, Impregnation, Performance (Engineering), Additives, Pressure, Molybdenum, Barium, Surface properties, Metals. Ceramic materials.

The techniques developed under a previous contract AF19 (604)-8486 were refined which allowed the addition of controlled amounts of Penning mixture (99.9% Ne, 0.1% Ar) to both planar and cylindrical cesium vapor diodes using impregnated tungsten (Philips Type B) emitters in the 1000C-1200C range. In the pressure region of 6.5 Torr, considerably improved performance resulted in the planar diodes at cesium bulb temperatures between 100C and 150C. Consideration is given to possible increased barium coverage on the emitter surface, resulting from the additive over pressure, as a mechanism for the enhancement. (Author)

AD-609 056 Div. 8, 7, 25
OTS Prices: HC $3.00/MF $0.75

Rome Air Development Center, Griffiss AFB, N. Y.
STUDY OF PART FAILURE MODES.

Final rept.,
by Lester J. Gubbins. Oct 64, 80p
Contract AF30 602 2732, AF30 602 2835,
Proj. 5519, Task 551902
RADC TDR64 377

Unclassified report

Descriptors: (*Electronic equipment, Failure (Mechanics)), (*Failure (Mechanics), Electronic equipment), Performance (Engineering), Capacitors, Resistors, Coils, Transformers, Diodes (Semiconductor), Transistors, Electron tubes, Electric relays, Electric switches, Electric connectors, Reliability (Electronics).

Data is presented showing the relative frequency of occurrence of the various failure modes of parts based on field data collected from certain ground electronic equipments and from individual parts tests. The data is compiled on 30 subcategories of parts, the major categories being capacitors, resistors, inductive devices, transistors, diodes, tubes, relays, switches and connectors. Two examples are given showing how to use the data in making decisions involved with the use of a multiplicity of parts to compensate for some failure modes. A discussion of categorizing failure modes is included. (Author)

AD-609 060 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Silicon Transistor Corp., Long Island, N. Y.
PRODUCTION ENGINEERING MEASURE TO INCREASE THE RELIABILITY OF THE TRANSISTOR TYPE 2N2034.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 64,
by Anthony Palmerini. 30 Sep 64, 22p
Contract DA36 039AMC01482E

Unclassified report

See also AD-606 191.

Descriptors: (*Transistors, Reliability (Electronics)), Processing, Performance (Engineering), Stresses, Temperature, Specifications, Failure (Mechanics), Life expectancy, Voltage.

Improvements were found in the electrical performance of the Transistor Type 2N2034 as a result of the process improvements. The limits of some of the electrical parameters have been tightened in a proposed military specification of this device. A failure acceleration rate of 12 for every increase of 5 watts dissipation had been found from the results of power stresses at three different levels. This leads to the prediction that the failure rate at 90 per cent confidence would be .05 per cent per 1000 hours when the device is subjected to a life test with power dissipation of 2.5 watts at case temperature of 100C. In order to verify this prediction, a life test program at 10-watt dissipation level has been planned. (Author)

AD-609 061 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

Lear Siegler, Inc., Grand Rapids, Mich.
DEVELOPMENT OF EXPERIMENTAL GAS DISCHARGE DISPLAY.
Quarterly progress rept. no. 4, 24 Jun-24 Sep 64.
Oct 64, 16p LSI-GR-1464
Contract NObsr89201, Proj. SR0080301, Task 9498

Unclassified report

See also AD-602 865.

Descriptors: (*Gas discharges, Display systems), (*Discharge tubes, Display systems), (*Display systems, Discharge tubes), Panels (Structural), Storage tubes, Photoelectric materials, Electric trigger controls, Circuits, Feasibility studies.

The purpose of this program is to develop an experimental prototype gas discharge display panel with internal storage capability. The panel will consist of a X-Y matrix of individual gas cells each of which can be selected and fired by the application of a short triggering pulse. The objectives are to develop a display with high light output, low firing and distribution voltages, and in a configuration such that eventual production panels can be fabricated at the lowest possible cost per unit cell. The primary objective during this reporting period was to review all work that preceded it and to perform experiments which would prove the practicality of the concepts involved. The results of the experiments conducted are presented.

AD-609 062 Div. 8
OTS Prices: HC $1.00/MF $0.50

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND.
Interim development rept. no. 17, 1 Nov-30 Nov 64,
by William A. Edson, Lyle C. Bacon, and Peter Georgiev. 15 Dec 64, 11p
Contract NObsr89536, Proj. SF0100201, Task 9294

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-607 049.

Descriptors: (*Frequency converters, Design), L band, S band, C band, X band, Diodes (Semiconductor), Impedance matching, Standing wave ratios, Performance (Engineering), Oscillators, Low-pass filters, High-pass filters, Klystrons.

The L- and S-band double-balanced converters are being manufactured. The C-band double-balanced converter was improved regarding Ka-band signal leakage into the C-band port; more work is being done in this respect. Average conversion loss is about 12 db. The X-band double-balanced converter was improved regarding X-band matching which presently meets the VSWR specification in the frequency band from 7 to 10.1 Gc but does not meet specifications in the frequency band 10.1 to 11.0 Gc. Effort to improve the match is continuing. Ten Sylvania D5354 diodes were received and tested individually and in a complete converter. Results are according to the specifications. The conversion loss is below 8 db for the individual diodes and below 10 db for the converter tests. The impedance characteristics do not differ significantly from those of the earlier D5253 diodes. (Author)

AD-609 064 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Syracuse, N. Y.
SEMICONDUCTOR LASER ARRAY TECHNIQUES (SEMLAT).
Quarterly interim rept. no. 1,
by C. S. Kim, H. Raillard, J. M. Smith, and R. Vuilleumier. Oct 64, 42p
Contract AF30 602 3414, Proj. 4506, Task 450608
RADC TDR64 419

Unclassified report

Descriptors: (*Lasers, Semiconductor devices), (*Diodes (Semiconductor), Lasers), Configuration,

Semiconductors, Piezoelectric transducers, Transducers, Optical equipment, Amplifiers, Oscillators, Crystal growth, Oxygen, Silicon, Germanium, Tin, Selenium, Tellurium, Instrumentation, Complex variables, Reflection, Gallium compounds, Arsenides.

The report contains information on the work done in the First Quarter of the Semiconductor Laser Array Program. Systems considerations directed at simplification of the array using a GaAs oscillator in lieu of a gas laser-GaAs preamplifier are presented. Progress on diode development is discussed. A pressure transducer used for fine tuning of the GaAs-oscillator was successfully tested. Experimental evaluation of a closely spaced back-to-back laser-amplifier assembly showing strong interaction between the two devices, is also included. (Author)

AD-609 065 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Motorola, Inc., Phoenix, Ariz.
DETAILED STUDY OF DELETERIOUS EFFECTS ON SILICON TRANSISTORS.
Quarterly technical documentary rept. no. 2 (Final), 29 Jan-28 Apr 64,
by Ki Dong Kang. Oct 64, 63p
Contract AF30 602 3244, Proj. 5519, Task 551902
RADC TDR64 352

Unclassified report

Descriptors: (*Semiconductor devices, Reliability (Electronics)), (*Transistors, Reliability (Electronics)), (*Silicon, Transistors), Surface properties, Aging (Materials), Oxides, Electric discharges, Voltage, Gain, Storage, Contamination, Degradation, Hydrogen, Heat treatment, Metal coatings, Electric currents.

Additional experimental work has been done to study the surface effects on bipolar and unipolar devices, some with metal - oxide - silicon structures. The results are related to the models presented in previous reports. An additional mechanism is proposed for changes which occur in metal - oxide - silicon structures in which a field is present perpendicular to the surface. (Author)

AD-609 066 Div. 8
OTS Prices: HC $3.00/MF $0.75

Motorola, Inc., Phoenix, Ariz.
FAILURE MECHANISMS AT METAL-DIELECTRIC INTERFACES.
Technical documentary progress rept. for 6 Mar-5 Jun 64,
by David Peterson. Oct 64, 56p
Contract AF30 602 3266, Proj. 5519, Task 551902
RADC TDR64 359

Unclassified report

See also AD-603 279.

Descriptors: (*Printed circuits, Reliability (Electronics)), (*Capacitors, Films), (*Metal films, Reliability (Electronics)), (*Dielectric films, Reliability (Electronics)), Glass capacitors, Electrodes, Capacitance, Circuits, Humidity, Tantalum compounds, Oxides, Silicon compounds, Dioxides.

The interface between a metal and a dielectric is representative of the type of interface found in microelectronic circuitry. Capacitors using thin film dielectrics have been used as a means of studying the changes induced in a metal-dielectric interface by electrical and thermal stress. Thin film capacitors which were exposed to 100 percent R. H. before top electrode evaporation showed larger changes under stress than similar units which were heated prior to electrode deposition. In general, all capacitors decreased in capacitance, dissipation factor and T.C.C. after stressing. Thin film capacitors stressed at 80 percent R.H. and 40 volts d.c. showed only minor changes in electrical properties. High temperature stress studies of thin film capacitors have been initiated. Thin film anodized Ta_2O_5 capacitors have shown little change in electrical properties under low temperature stress. Ta_2O_5 capacitors have been prepared for radioactive tracer studies, and will be stressed at higher levels than the first group. Preliminary study indicates that radioactive tracer techniques may be used in the study of diffusion occurring at the metal-dielectric interfaces, where anodized Ta_2O_5, SiO_2 thermally grown on a silicon metal, and gas plated boro alumina silicate glass film are the dielectrics. (Author)

AD-609 070 Div. 8, 30
OTS Prices: HC $3.00/MF $0.75

Electronic Associates, Inc., Princeton, N. J.
PROGRAMMING STUDIES FOR RADIO SIGNAL RAY TRACING.
Final rept.,
by David Basson. 31 May 64, 82p
Contract AF19 628 1658, Proj. 5930, Task 593007
AFCRL 64 449

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Programming (Computers), Radio signals), (*Radio signals, Ionospheric propagation), (*Analog computers, Plotters), Low frequency, Radio waves, Propagation, Upper Atmosphere, Ducts, Simulation, Computers, Trosphosphere, Wave transmission, Computer logic, Refractive index, Experimental data, Graphics.

An analog computer program and solution for the problem of 5 kilocycle radio ray tracing in two dimensions simulating the ionosphere, exosphere, and hypothesized plasma ducts is presented. Calculations of the Group time delay and revised scaling for tracing rays launched from 0 <or= 40 degrees are preformed using a modified 2D program at 5 kc. Suitable forms for computer implementation of three dimensional ray tracing at low frequencies are derived. A general analysis of the scaling problems for ray tracing at frequencies from 5 kc. to 14 mc. is also presented, and a complete computer program for 3D ray tracing at 4 megacycles is presented. A special feature of this program is the use of HYDAC for generating three functions of two variables. A trospospheric ray tracing study that incorporated a two-dimensional function of refractive index was also undertaken on the HYDAC 2000 digital/analog computer. Data was obtained and a complete set of runs made. The results confirmed the feasibility of this approach. (Author)

AD-609 073 Div. 8, 32
OTS Prices: HC $1.00/MF $0.50

Stanford Electronics Labs., Stanford, Univ., Calif.
BIBLIOGRAPHY OF TECHNICAL REPORTS ISSUED BY STANFORD ELECTRONICS LABORATORIES DURING 1959.
(1960), 11p

Unclassified report

Descriptors: (*Bibliographies, Electronics), (*Electronics, Bibliographies), Control systems, Communication theory, Circuits, Masers, Amplifiers,

Transistors, Solid state physics, Ionosphere, Antennas, Systems engineering, Electronic equipment.

Contents: Control systems, information and circuit theory, electron devices and directly associated circuits, masers and parametric amplifiers, transistors and other solid state devices, radioscience; ionosphere studies, and antennas, systems techniques, equipments and subcomponents, reports not otherwise categorized.

AD-609 074 Div. 8, 25, 30
OTS Prices: HC $2.00/MF $0.50

Stanford Electronics Labs., Stanford Univ., Calif.
ABSTRACTS OF UNCLASSIFIED TECHNICAL REPORTS ISSUED BY STANFORD ELECTRONICS LABORATORIES DURING 1959.
(1960), 31p

Unclassified report

Descriptors: (*Electronics, Abstracting), Bibliographies, Electronic equipment, Reports, Documentation, Lasers, Semiconductor devices, Electromagnetic waves, Computers, Radio waves, Propagation, Networks, Theory, Communication theory, Electronics laboratories.

The work herein abstracted pertains to the broad general classifications of radio propagation research, electron devices research, solid-state electronics research, and research in the areas of control systems, network theory, communication theory, and systems techniques. It does not include classified work in the areas of systems techniques and radio propagation research; however attention is directed to a companion publication which lists titles, on an unclassified basis, of all reports, both classified and unclassified, in all of these activities.

AD-609 075 Div. 8
OTS Prices: HC $4.00/MF $1.00

Stanford Electronics Labs., Stanford Univ., Calif.
ABSTRACTS OF UNCLASSIFIED TECHNICAL REPORTS ISSUED BY STANFORD ELECTRONICS LABORATORIES, 1949 THROUGH 1958.
1964 117p

Unclassified report

Descriptors: (*Electronics, Abstracting), Communication systems, Traveling-wave tubes, Electric filters, Transistors, Semiconductors, Matched filters, Microwave equipment, Diodes, Radio waves, Noise (Radio), Crystal video receivers, Ionospheric propagation, High frequency, Parametric amplifiers, Electron beams, Doppler systems, Radar signals, Relaxation oscillators, Ultrahigh frequency, Very high frequency, Meteors, Klystrons, Cyclotrons, Masers, Demodulation, Electrostatics, Digital computers.

AD-609 076 Div. 8
OTS Prices: HC $3.00/MF $0.75

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
INTERFERENCE SUPPRESSION STUDIES. STUDIES OF ANTENNA SIDE-LOBE REDUCTION.
Final rept.,
by H. Kritikos, R. Dresp, and K-C Lang. Oct 64, 80p
MSEE-64-25, vol. 1
Contract AF30 602 2888, Proj. 4540, Task 454003
RADC TDR64 355 V1

Unclassified report

See also AD-609 077.

Descriptors: (*Antennas, Radiofrequency interference), (*Radiofrequency interference, Antennas), (*Antenna lobes, Radiofrequency interference), Design, Signal-to-noise ratio, Antenna configurations, Theory, Special functions(Mathematical), Tunneling (Electronics), Gain, Antenna radiation patterns, Horn antennas, Parabolic antennas, Optimization, Mathematical models, Matrix algebra, Attenuation, Microwaves, Fourier analysis, Partial differential equations.

This work is divided into two parts: A theoretical study and a discussion of actual applications. In the first part, a brief introduction of the common antenna synthesis procedures is presented. Two new novel approaches were also suggested. First, the use of the signal-to-noise ratio as a criterion of design of arrays. Second, the use of the prolate spheroidal functions for aperture synthesis. In the second part, a number of high performance antennas as well as experimental work performed in the University of Pennsylvania is discussed. Practical techniques, such as tunneling application of microwave absorbing material, are described and evaluated. (Author)

AD-609 077 Div. 8
OTS Prices: HC $2.00/MF $0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
INTERFERENCE SUPPRESSION STUDIES. MULTIPLE USE OF ANTENNAS AND ANTENNA STACKING.
Final rept.,
by I. Shin. Oct 64, 45p MSEE-64-25, vol. 2
Contract AF30 602 2888, Proj. 4540, Task 454003
RADC TDR64 355 V2

Unclassified report

See also AD-609 076.

Descriptors: (*Antennas, Radiofrequency interference), (*Radiofrequency interference, Antennas), Multiplex, Design, Antenna configurations, Antenna radiation patterns, Feasibility studies.

The feasibility of the multiple use of a common antenna and stacking of several antennas on a small site is studied. The problems involved are found and the techniques available based on current technology are discussed. It is concluded that a combination of multiplexing and stacking of antennas is feasible and desirable. (Author)

AD-609 078 Div. 8
OTS Prices: HC $3.00/MF $0.75

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
INTERFERENCE SUPRESSION STUDIES. NOISE AND INTERFERENCE MONITORING STUDIES.
Final rept.,
by S. Srikantan. Oct 64, 74p MSEE-64-25, vol. 3
Contract AF30 602 2888, Proj. 4540, Task 454003
RADC TDR64 355 V3

Unclassified report

See also AD-609 077.

Descriptors: (*Antennas, Radiofrequency interference), (*Radiofrequency interference, Antennas), (*Noise (Radio), Monitors), Meters, Radio signals, Antenna configurations, Thermistors, Density, Programming (Computers), Circuits, Bandwidth.

The report is concerned with the establishment of a signal density monitoring facility. The facility, which is

designed to measure ambient noise and signal densities over the frequency range from 100 Mc to 30 Gc, is described from a block diagram point of view. Two other studies of various parameters and equipment which affect the operation of the facility are included. The first concerns a study of the effect of AGC circuitry on the output of a RF noisemeter when the input signal is not a continuous function of time. The study has both theoretical and experimental aspects. An equivalent circuit for the noisemeter is derived and programmed on an analog computer. The second study is concerned with various noisemeter output circuits and the effect of receiver bandwidth. (Author)

AD-609 079 Div. 8
OTS Prices: HC $1.00/MF $0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
INTERFERENCE SUPPRESSION STUDIES. DIRECTIONAL MODE COUPLERS.
Final rept.,
by R. J. Kalagher. Oct 64, 9p MSEE-64-25, vol. 4
Contract AF30 602 2888, Proj. 4540, Task 454003
RADC TDR64 355 V4

Unclassified report

See also AD-609 077.

Descriptors: (*Antennas, Radiofrequency interference), (*Radiofrequency interference, Antennas), (*Waveguide couplers, Antennas), Transmission lines, Coaxial cables, Performance (Engineering).

This report covers work done on directional couplers from 1 September 1963 to 15 December 1963. It includes a re-evaluation of the rectangular waveguide couplers previously reported in Volume I, Final Report, Task 1 of contract AF 30 (602)-1615, and additional work on TE sub 11 mode coaxial directional couplers reported in the Final Report of contract AF 30 (602)-1785. (Author)

AD-609 080 Div. 8
OTS Prices: HC $2.00/MF $0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
INTERFERENCE SUPPRESSION STUDIES. STUDIES OF TRANSMITTER BANDWIDTH LIMITING AND SPURIOUS OUTPUT SUPPRESSION.
Final rept.,
by S. Srikantan. Oct 64, 31p MSEE-64-25, vol. 5
Contract AF30 602 2888, Proj. 4540, Task 454003
RADC TDR64 355 V5

Unclassified report

See also AD-609 079.

Descriptors: (*Radiofrequency interferency, Radio transmitters), (*Radio transmitters, Radiofrequency interference), Modulation, Distortion, Electron tubes, Radiofrequency amplifiers, Phase shift, Electromagnetic pulses, Bandwidth, Performance (Engineering), Networks, Radio signals, Feedback.

A review of existing techniques for reducing intermodulation and harmonic distortion in radio transmitters is given. These techniques include linearization of amplifier stages by proper choice of tubes, tube design and operating point, the use of negative feedback and predistortion of the signal to be amplified. Filtering was not considered in this study. It is shown theoretically that distortion can be reduced by multiphase amplifier techniques. This was checked experimentally on a three phase amplifier at audio frequencies. The technique can be used at higher frequencies if the wide band phase splitting networks can be designed. (Author)

AD-609 082 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Electronics Labs., Stanford Univ., Calif.
BIBLIOGRAPHY OF TECHNICAL REPORTS ISSUED BY STANFORD ELECTRONICS LABORATORIES, 1949 THROUGH 1958.
1964 22p

Unclassified report

Descriptors: (*Bibliographies, Electronics), (*Electronics, Bibliographies), Circuits, Theory, Radio waves, Propagation, Ionosphere, Antennas, Semiconductor devices, Transistors, Lasers, Parametric amplifiers, Masers.

Contents:
Information and Circuit Theory
Electron Devices and Directly Associated Circuits
Masers and Parametric Amplifiers
Transistors and Other Solid-State Devices
Radio Propagation; Ionosphere Studies, and Antennas
Systems Techniques
Equipments and Subcomponents
Uncategorized Reports.

AD-609 085 Div. 8, 2
OTS Prices: HC $4.00/MF $1.00

Radiation Lab., Univ. of Michigan, Ann Arbor.
IONOSPHERIC DISTURBANCES AND THEIR EFFECTS ON THE PROPAGATION OF HF ELECTROMAGNETIC WAVES.
Final rept. for Jun 60-Jun 64,
by Chaio-Min Chu, Gunnar Hok, and John J. LaRue.
Sep 64, 128p ORA-3673-1-F
Contract AF19 604 7257, Proj. 4649, Task 464901
AFCRL 64 916

Unclassified report

Descriptors: (*Electromagnetic waves, Ionospheric disturbances), (*Ionospheric distrubances, Radio waves), (*Radio waves, Ionospheric propagation), Propagation, High frequency, Differential geometry, Perturbation theory, Mathematical models, Numerical analysis, Viscosity, Mechanical waves, Magnetic fields, Thermal conductivity, Atmosphere.

This report is concerned with the effect of ionospheric disturbances on HF radio waves whose propagation path is at a large distance from the source of the disturbance. The perturbation of the HF radio waves is assumed to be due to mechanical waves propagating in the atmosphere. The macroscopic equations governing the propagation of mechanical waves in the atmosphere, including the effects of viscosity and thermal conductivity, are developed. A simple model of the atmosphere is proposed and a technique, suitable for numerical analysis, is developed for determining the various modes propagating. The effect of the earth's magnetic field on the propagation of mechanical waves is evaluated and it is concluded that this effect is small. The modification of the disturbance due to the presence of charged particles is discussed in conjunction with a comparison of the microscopic and macroscopic formulation of the equations of motion. An idealized description of the source is given in the appendix and some solutions to some simple problems are discussed. (Author)

AD-609 087 Div. 8, 7
OTS Prices: HC $1.00/MF $0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RESTRICTIONS ON LINEAR PHASE, LOW-PASS NETWORKS WITH PRESCRIBED PARASITIC LOADS,
by George I. Zysman and Herbert J. Carlin.
Nov 64, 25p PIBMRI-1228-64
Contract AF30 602 2868, Proj. 8505
RADC TDR64 408

Unclassified report

Descriptors: (*Networks, Low-pass filters), (*Low-pass filters, Networks), (*Phase control devices, Low-pass filters), Tunnel diodes, Circuits, Linear systems, Electrical properties, Mathematical analysis, Electrical engineering, Amplifiers, Gain.

The problem considered here is that of a low-pass, linear phase filter operating between a resistive generator and a prescribed load containing parasitic reactances. The presence of the parasitic elements results in a minimum time delay-bandwidth restriction of a signal propagation between the generator and the load. Such a restriction is derived here by considering gain-bandwidth integrals for Gaussian transfer amplitude filters. For the very important case of unit d-c gain, these restrictions are expressed in terms of the Riemann Zeta function. For gains less than unity at d.c., the results are in terms of Appel integrals. The loads considered here have all their zeros of transmission at infinity. (Author)

AD-609 088 Div. 8
OTS Prices: HC $3.00/MF $0.75

Sperry Gyroscope Co., Great Neck, N. Y.
WIDEBAND BEAM-TYPE PARAMETRIC AMPLIFIER.
Final technical rept. for 1 Apr 63-31 Jul 64,
by Richard Eng. Nov 64, 59p NA-8210-8364-4
Contract AF30 602 3055, Proj. 5573, Task 557301
RADC TDR64 424

Unclassified report

See also AD-605 369.

Descriptors: (*Parametric amplifiers, X band), Microwave amplifiers, Broadband, Superhigh frequency, Gain, Noise (Radio), Pumping (Electronics), Electron beams, Helixes, Coupling circuits, Magnetic fields, Electron guns, Electron tubes, Klystrons, Signals.

The objectives of the program were to develop a beam-type parametric amplifier at X-band with a bandwidth of 20 percent, a gain of 25 db, and a double-channel noise figure of 2 db. This final technical report covers the experimental study, design, construction, and test of the tube. Using a modified bifilar helix as the coupler circuit and a periodic quadrupole circuit as the pump circuit, an experimental Kompfner dip greater than 20 db in 6 percent of the frequency band or 10 db in 10 percent of the band was achieved. An electronic gain of 7 db, with a small variation across the band, was insufficient to overcome the 12-db loss on the couplers and electron beam. The pump power used was 14 watts. Signal and idler frequencies were investigated. The ion-oscillation problem is discussed. Other discussions are concerned with the problems of bifilar helix fabrication, electron gun alignment, and magnetic field shaping. Recommendations for future refinement are made. (Author)

AD-609 090 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Airborne Instruments Lab., Inc., Deer Park, N. Y.
MILLIMETER AND SUBMILLIMETER COMPONENT DEVELOPMENT.
Quarterly interim rept. no. 2, Jun-Aug 64,
by J. J. Taub, J. Cohen, H. J. Hindin, G. Kurpis, and F. R. Arams. Nov 64, 54p
Contract AF30 602 3343, Proj. 5573, Task 557304
RADC TDR64 468

Unclassified report

Descriptors: (*Millimeter waves, Waveguides), (*Waveguides, Millimeter waves), Waveguide filters, Ferrites, Diodes (Semiconductor), Demodulators, Dielectrics, Extremely high frequency, Filters (Electromagnetic wave), Band-pass filters, Dielectric properties, Rotation, Resonators, Quartz, Varactor diodes, Mixers (Electronic), Semiconductors, Indium alloys, Antimony alloys, Transmission lines.

Techniques for designing filters, ferrite devices, diode mounts, and radiation detectors in oversize waveguide are being investigated. The filters constructed and evaluated were: a 33-Gc four-port dielectric slab filter, a 330-Gc two-port dielectric-slab filter in its low-frequency region, a 33-Gc one-and two-resonator band-pass filter using etched holes in plating on quartz as susceptance elements, and also a 147-Gc band-pass filter using holes in metal plates as susceptance elements. In addition, a 330-Gc four-port dielectric-slab filter structure was constructed. Measurements of ferrite dielectric constants, loss tangents, and mismatches were made. Low-loss Faraday rotation was demonstrated. An oversize-waveguide focused diode mount and a saturation mount were constructed and tested. The study of bulk semiconductors as radiation detectors and mixers was extended to the case where hot electrons give rise to the detectable effect. Preliminary numerical data is presented for n-type Indium-Antimonide.

AD-609 093 Div. 8
OTS Prices: HC $4.00/MF $1.00

Little (Arthur D.) Inc., Cambridge, Mass.
METHODS FOR LOW POWER TEMPERATURE CONTROL.
Final rept. for 2 Jul 62-29 Feb 64,
by Igor A. Black and John F. Peterson. 29 Feb 64, 126p
Contract DA36 039sc90883, Task 1G640306D488 02

Unclassified report

Descriptors: (*Temperature control, Crystal ovens), (*Quartz, Crystal ovens), (*Crystal ovens, Quartz), Thermostats, Stability, Temperature, Degasification, Thermal insulation, Switching circuits, Design, Heating elements, Specifications, Miniature electronic equipment, Seals (Stoppers).

The methods and devices by which the temperature of a single quartz crystal blank can be maintained at a constant operating temperature in extreme environmental conditions have been investigated. Four types of ovens, in which temperatures are controlled by a snap-action thermostat, were studied: (1) a 500-milliwatt oven (Type E6) requiring accessibility to the crystal and operating at +75C ±2.5C over a -40C to +60C ambient; (2) a 50-milliwatt sealed oven (Type F6G) with similar operating requirements; (3) a less costly, 100-milliwatt sealed oven (Type G6G) with similar operating requirements; and (4) a 250-milliwatt oven (Type H6) requiring accessibility to a temperature-compensated crystal and operating at 0C±3C over an ambient range from -55C to 0C. Five ovens of each type were constructed and successfully tested. The amplitude of the crystal operating temperature oscillation, power consumption and warm-up time are within the required limits for the type E6, G6G and H6 ovens. Power consumption of the type F6G ovens is 50% higher than specified. (Author)

AD-609 104 Div. 8
OTS Prices: HC $10.75/MF $3.50

Illinois Univ., Urbana.
ABSTRACTS OF THE ANNUAL SYMPOSIUM ON THE USAF ANTENNA RESEARCH AND DEVELOPMENT PROGRAM (14th), 6-8 OCTOBER, 1964.
8 Oct 64, 776p
Unclassified report

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Descriptors: (*Antennas, Symposia), (*Symposia, Antennas), Abstracting, Antenna radiation patterns, Slot antennas, Dipole antennas, Helix antennas, Spiral antennas, Air force research, Polarization, Design, Theory, Reflectors, Lens antennas, Parabolic antennas, Antenna configurations, Microwave equipment, Communication systems, Ferrites, Aircraft antennas, Electromagnetic lenses, Phased arrays, Simulation, Phase shifters, High frequency, Broadband, Feedback.
Contents:
Polarization control
New techniques
Theory
Hi gain antennas
Environmental
Scanning technique.

AD-609 118 Div. 8, 6
OTS Prices: HC $2.00/MF $0.50

Dumont (Allen B.) Labs. Div., Fairchild Camera and Instrument Corp., Clifton, N. J.
DESIGN AND DEVELOPMENT OF AN ELECTRONIC IMAGE MAGNIFIER.
Final rept.,
by Joseph Burns. 30 Sep 64, 42p SI-5672
Contract N123 62738 34165A
Unclassified report
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Image intensifiers (Electronics), Design), (*Image tubes, Design), Electron tubes, Electrostatics, Cathodes (Electron tubes), Electrodes, Lenses, Display systems, Electron optics.
The basic theoretical electron optical design principles of the image magnifier were under development, with interrelationships between the following parameters being studied: magnification versus resolution, applied voltages, and distortion; and length versus resolution and magnification range. The laboratory prototype tube should have the following characteristics: flat input and output; variable magnification over the 4:1 to 1:1 range (i.e., differing cathode areas will be imaged onto foll-screen area); distortion (resulting on viewing a pattern of horizontal or vertical straight lines) to be less than 3% of the diameter of the useful screen area); resolution equal to or greater than 500 TV lines per picture; and small length/diameter ratio. The initial concept for obtaining variable magnification was to form a bi-potential spherical lens between two apertured electrodes. Later, individual lens functions were to perform field flattening, focus, magnification control, and geometry correction.

AD-609 125 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

General Telephone and Electronics Labs., Inc, Bayside, N. Y.
OPTICAL PROPERTIES OF BINARY GAS PLASMAS.
Rept. for 15 Nov 63-14 Sep 64,
by W. R. Watson and V. J. Fowler. 30 Nov 64, 26p
GTEL-TR-64-257.10
Contract AF33 615 1050, Proj. 4152, Task 415202
AL TR64 289
Unclassified report

Descriptors: (*Plasma medium, Optical properties), (*Discharge tubes, Plasma medium), Gases, Lasers, Helium, Neon, Mass spectroscopy, Spectrum analyzers, Pressure, Vapor pressure, Intensity, Performance (Engineering).

This report describes a project (1) to determine changes that occur in the composition of the gas during operation of a discharge tube such as is used in helium-neon lasers, and (2) to develop suitable instrumentation for such investigations. The omegatron mass spectrometer system that was developed is described, and data obtained with it on a helium-neon laser are reported. The laser output power and intensities of some lines of the emission spectrum of the discharge are also reported as functions of time of continuous operation of this laser. (Author)

AD-609 128 Div. 8
OTS Prices: HC $1.00/MF $0.50

Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF Ku-BAND LOW-NOISE DUAL OUTPUT FUNCTION TRAVELING-WAVE TUBES.
Interim development rept. no. 1, 1 Jul-30 Sep 64.
25 Nov 64, 19p
Contract NObsr91325, Proj. SF01100201, Task 9294
Unclassified report

Descriptors: (*Traveling-wave tubes, K band), Noise (Radio), Electron guns, Helixes, Focusing, Magnetic fields, Design, Performance (Engineering), Impedance matching, Standing wave ratios.

Preliminary studies have shown that the helix design of present MEC Ku-band tubes are not centered for maximum performance in the 12 to 18 Gc band. Therefore a design change has been made to correct the situation. Magnetic-field and package-weight considerations have dictated an Alnico V magnet for the PM portion of the PM-PPM focusing array.

AD-609 133 Div. 8, 5, 25, 30
OTS Prices: HC $4.00/MF $1.00

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
A SUMMARY OF CURRENT RESEARCH AT THE MICROWAVE RESEARCH INSTITUTE.
Progress rept. no. 26, 1 Apr-30 Sep 64,
by Ernst Weber. 30 Sep 64, 149p PIBMRI-R-452.26-64
Contract AF49 638 1402, Proj. 4751
Unclassified report

Descriptors: (*Microwave equipment, Scientific research), (*Reports, Microwave frequency), Electromagnetism, Plasma physics, Solid state physics, Microwave networks, Networks, Electro magnetic waves, Electronics, Antennas, Plasma, Waveguides, Resonators, Diffraction, Dielectrics, Diodes, Electromagnetic fields, Cyclotron waves, Magnetic materials, Hydrocarbons, Ferroelectric materials, Cavity resonators, Hypersonic flow, Band-pass amplifiers, Communication theory, Communication systems, Control systems, Pseudo-random systems, Game theory, Decision theory, Pattern recognition, Topology.

Contributions are compiled under six descriptive subject headings: electromagnetics, plasma electrophysics and

electronics, solid state and materials research, microwave circuits, network theory, and systems, communications, and control.

AD-609 149 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF A METHOD OF PHASE MEASUREMENTS IN THE CASE OF NONCOHERENT SIGNALS,
by V. I. Medvedev. 13 Nov 64, 14p
FTD TT64 1173; TT 65 60449
Unclassified report

Unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 3: Fizika, Astronomiya (USSR) 1963, v. 18, no. 6, p. 77-84.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electromagnetic waves, Phase measurement), (*Radio signals, Phase measurements), (*Phase measurements, Electromagnetic waves), Frequency, Theory, Radiofrequency interference, USSR.

A method for measuring the change in phase difference between frequency-stable noncoherent signals with a signicant frequency difference is considered and demonstrated. Experimental results varify the possibility of making phase measurements between noncoherent signals by this method. (Author)

AD-609 165 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

AVCO-Everett Research Lab., Everett, Mass.
LINEAR THEORY OF AN MHD OSCILLATOR,
by James E. McCune. Dec 64, 39p AVCO-RR-198
Unclassified report

See also AD-437 128.

Descriptors: (*Magnetohydrodynamics, Oscillators), (*Oscillators, Linear systems), Generators, Electric power production, Energy conversion, Hall effect, Theory, Alternating current, Direct current, Gas ionization, Gases, Plasma physics, Electromagnetic waves.

The linear theory of AC fluctuations in an MHD channel subject to the Hall instability of Velikhov ('Hall instability of current-carrying slightly-ionized plasmas'. Symp. MPD. Elec. Power Gen., Newcastle-upon-Tyne, 1962) is explored. It is shown that the system as a whole (plasma, plus boundaries, plus external circuitry) is stable to the Velikhov mode except at certain resonant acoustic frequencies. If these resonant frequencies are excited, channels of sufficient size can be made to oscillate and produce net AC power. However, non-linear effects limit the AC power level severely for this geometry, and adversely affect the DC performance of the channel. The analysis shows that resonant fluctuations can be controlled by external circuitry. (Author)

AD-609 175 Div. 8, 19
OTS Prices: HC $1.00/MF $0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
INTERFERENCE SUPPRESSION STUDIES. STUDY OF TECHNIQUES FOR SPECTRUM SIGNATURE MEASUREMENTS.
Final rept., vol. 6,
by R. C. Harper. Oct 64, 14p MSEE-64-25
Contract AF30 602 2888, Proj. 4540, Task 454003
RADC TDR64 355 V6
Unclassified report

See also AD-609 076 through AD-609 080.

Descriptors: (*Radar interference, Suppressors), (*Radiofrequency interference, Suppressors), (*Radiofrequency spectroscopy, Test methods), Noise (Radar), Noise (Radio), Communication equipment, Ground-controlled approach radar, Radar antennas, Radar tracking, Radar scanning, Signal generators, Spectrum analyzers.

Special features of a spread spectrum communication transceiver (GRC-115), a GCA radar (AN/CPN-4), and the two BMEWS radars (AN/FPS-49 and -50) are briefly reviewed for the purpose of determining their effects upon spectrum signature testing. It was necessary to specify in more detail how antenna patterns were to be taken, what provision should be made for monopulse systems, what testing with a pulsed 'interfering' signal was necessary (i.e. for spread spectrum type receivers), and what consideration should be given to MTI capabilities. Concerning the restrictions placed on the test procedures due to limitations of available test equipment, it was found that what originally appeared as shortcomings of test equipment have to a large extent been overcome by new equipment recently available. This does not mean that presently available equipment completely answers all the measurement problems. For example, signal generators having higher output power would definitely improve measurement accuracy and dynamic range, and possibly reduce measurement time.

AD-609 192 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
Quarterly progress rept. no. 12, 9 Mar-8 Jun 64
by Edward T. Rate. 8 Jun 64, 23p
Contract DA36 039SC85965
Unclassified report

Descriptors: (*Cathode ray tubes, Production), Electron guns, Manufacturing methods, Ion bombardment, Cathodes (Electron tubes), Electron beams, Performance (Engineering), Specifications, Design.

As discussed in the tenth and eleventh quarterly reports, the advantages of the Focus Reflex Modulation (FRM) gun design were not compatible with good oxide cathode life when used in a conventional display tube. Consequently, a pilot run change was made whereby the FRM gun design could be utilized in a high resolution cathode-ray tube with a dispenser cathode. The dispenser cathode is capable of withstanding the ion bombardment produced by these systems. (Author)

AD-609 193 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
Quarterly progress rept. no. 13, 9 Jun-8 Sep 64,
by Edward T. Rate. 8 Sep 64, 21p
Contract DA36 039SC85965
Unclassified report

Descriptors: (*Cathode ray tubes, Production), Electron guns, Manufacturing methods, Ion

bombardment, Cathodes (Electron tubes), Electron beams, Performance (Engineering), Design, Tests.

Three preproduction UHR tubes have been completed. Preproduction tube construction and processing are described. A list of the pilot-line manufacturing equipment is included. (Author)

AD-609 199 Div. 8
OTS Prices: HC $4.00/MF $0.75

Signal Corps Logistics Evaluation Commitee, Philadelphia, Pa.
EVALUATION OF THE ELECTRONIC FAILURE REPORT PROGRAM,
Apr 60, 105p SC-Log-Gp-60-146
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronic equipment, Failure (Mechanics), (*Failure (Mechanics), Electronic equipment), Reliability (Electronics), Military requirements, Costs, Statistical analysis, Maintenance, Installation, Quality control, Life expectancy.

An evaluation is made of Whether EFR operations are producing results commensurate with overall costs; Whether benefits derived therefrom warrant the expenditure; and Whether the resultant data are providing additional information of sufficient significance over and above that being provided by the Unsatisfactory Equipment Report (UER) Program (AR 700-38) to justify continuation of the EFR Program.

AD-609 211 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Texas Instruments, Inc., Dallas.
MICROELECTRONIC FREQUENCY AND TIME STANDARD.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 64.
30 Oct 64, 62p TI-1-807240-1
Contract NObsr91352, Proj. SR0080303, Task 9624
Unclassified report

Descriptors: (*Subminiature electronic equipment, Time-interval counters), (*Frequency, Standards), (*Semiconductor devices, Subminiature electronic equipment), (*Semiconductors, Networks), Crystal oscillators, Solid state physics, Microminiaturization (Electronics), Printed circuits, Semiconductors, Oscillators, Electronics, Amplifiers.

The program was initiated with a study phase wherein the design philosophies were determined. A reliability program was started and each engineer was assigned his area of responsibility. The oscillator circuit has been designed and implemented with all the circuitry on a semiconductor network (SCN) except the crystal, a phase shift network, and the frequency adjustment controls. The distribution amplifier has been designed using SCN's except for the power output stage. A mockup of the system is being constructed and will be used as a design tool to prevent major design problems and to provide physical evidence of the usability of the design prior to fabricating the equipment. (Author)

AD-609 213 Div. 8
OTS Prices: HC $2.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
APPLICATION OF SEMI-CONDUCTOR DEVICES TO HIGH POWER DUPLEXERS.
Quarterly technical rept. no. 1, 1 Apr-30 Jun 64,
by Paul Basken. Oct 64, 27p
Contract AF30 602 3278, Proj. 5573, Task 557304
RADC TDR64 396
Unclassified report

Descriptors: (*Semiconductor devices, Microwave equipment), (*Switching circuits, Diodes (Semiconductor)), Solid state physics, Theory.

The purpose is to design and develop a breadboard model of a high-power solid state duplexer having the following design goals: frequency range, 5.4 to 5.9 gc; low-level VSWR 1.4 max; low-level insertion loss 0.5 db max; arc loss 0.4 db max; recovery time 10 mu sec max; peak power 1 megawatt; average power 1000 watts; life 10,000 hours min; and high-power isolation 30 db min. A detailed description of a series of experiments to determine the junction temperature behavior of a PIN diode while subjected in the forward biased state to pulsed RF energies is presented.

AD-609 221 Div. 8
OTS Prices: HC $2.00/MF $0.50

SFD Labs., Inc., Union, N. J.
X-BAND PHASED ARRAY TUBE DEVELOPMENT.
Final rept.,
by S. Sussman. Nov 64, 31p
Contract AF30 6023420, ARPA Order 136
Unclassified report

Descriptors: (*Microwave amplifiers, Performance (Engineering)), (*Crossed field device, X band), Electrodes, Design, Life expectancy, Voltage, Direct current, Electric discharges, Broadband, Circuits.

Control electrode turn off has been demonstrated at X-band, using two different control electrode geometries. A 200 hour life test has been completed on a tube operating at 100 kw peak power output with control electrode turn off. Dc hold off and field distribution studies have yielded geometries with dc breakdown voltages greater than 25 kv. Broad band, forward wave circuits have been examined. One of these circuits, the space harmonic choke supported interdigital line, is approaching hot test. (Author)

AD-609 222 Div. 8, 20
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
PROPAGATION OF ELECTROMAGNETIC ENERGY IN THE PRESENCE OF IONIZED MEDIA (PLASMA). MICROWAVE DETECTION BY A MAGNETOPLASMA.
Final rept. phase II,
by Bernard Schuldiner and Kalman Kalikstein.
21 Dec 64, 35p IRP-62
Unclassified report

Rept. on In-House Independent Research Program.

Descriptors: (*Electromagnetic waves, Plasma medium), (*Plasma medium, Electromagnetic waves), (*Microwaves, Identification), Monitors, Propagation, Sensitivity, Light Quenching (Inhabition), Differential equations, Electrons.

A magnetoplasma microwave detector which utilizes a quenching of light output in the afterglow of a magnetoplasma has been developed and is described. The behavior of this detector in terms of gas parameters, magnetic field and microwave signal is discussed. Suggestions for improving detector sensitivity are presented. (Author)

AD-609 230 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 8, 14 Feb-14 Jun 64,
by P. N. Oakes. 1964, 19p
Contract DA36 039sc86731

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-602 860.

Descriptors: (*Cathode ray tubes, Manufacturing methods), (*Vidicons, Manufacturing methods), (*Electron tube parts, Deflection), Electrostatics, Electron tube heaters, Performance (Engineering), Vapor plating, Vacuum apparatus, Aluminum, Glass, Design, Voltage.

The limited test data obtained to date has proven that the adaptation of the electrostatic deflectron to vidicon use is advantageous over conventional deflectron vidicon designs. The results evidenced by the use of the low power heater (Pierce type) are indicative that this construction is not desirable at this time. (Author)

AD-609 231 Div. 8
OTS Prices: HC $3.00/MF $0.75

Stanford Electronics Labs., Stanford Univ., Calif.
A STUDY OF SEVERAL MICROWAVE COMPRESSION FILTER TECHNIQUES.
Final rept.,
by H. S. Hewitt, W. R. Kincheloe, Jr., and M. H. Musser.
Nov 64, 72p
Contract AF30 602 2985, Proj. 4505, Task 450501
RADC TDR-64 398

Unclassified report

Descriptors: (*Microwave frequency, Pulse compression), (*Pulse compression, Microwave frequency), Frequency modulation, Phase shifts, Printed circuits, Delay circuits, Transmission lines, Coupling circuits, Scanning, Radar scanning, Design, Construction, Performance (Engineering).

Linear passive filters which decrease the duration of a frequency modulated pulse ('pulse compression' filters) are finding increasing application in radar and scanning receiver systems. This report describes the design, construction, and performance of several compression filters intended for use in a particular scanning receiver. These filters were designed to compress pulses in which the frequency varies linearly with time between 1 Gc. and 2 Gc., nominally at a rate of 20 Megacycles per second per nanosecond. The intent of this report is not to exhaustively treat each type of filter, but rather to provide a variety of possible approaches to compression filter realization, to provide design information, and to weigh some of the advantages and disadvantages of each type of filter. Although the filters described here are designed for a particular scan rate and frequency range, a similar approach could be used over a wide range of system parameters. With this in mind, an effort has been made to present design data in such a way as not to limit its generality or applicability. (Author)

AD-609 235 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE FOR MECHANIZATION OF HIGH-RELIABILITY CAPACITORS.
Quarterly rept. no. 7, 30 Jun-30 Sep 64,
by J. H. D. Folster, P. M. Kennedy, and G. E. Walters.
30 Sep 64, 16p
Contract DA36 039AMC01460E

Unclassified report

Descriptors: (*Paper capacitors, Manufacturing methods), (*Capacitors, Reliability (Electronics)), (*Electronic equipment, Quality control), Manufacturing methods, Production, Military requirements, Design, Failure (Mechanics), Scheduling, Plastics, Soldering, Industrial equipment, Material forming.

Work on the production design engineering and design of pilot line equipment continues. Of the 28 major subassemblies to be used in the mechanized high--reliability capacitor assembly operation, 10 are complete, and another 14 are in various stages of production. (Author)

AD-609 238 Div. 8, 32
OTS Prices: HC $2.00/MF $0.50

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
LIST OF TECHNICAL AND SCIENTIFIC REPORTS AND TECHNICAL MEMORANDA, JULY 1946 - JULY 1964.
July 64, 44p
Contracts N50ri76, AF19 604 786, Projs. NR371 016, NR384 903

Unclassified report

Descriptors: (*Electronics, Bibliographies), (*Bibliographies, Electronics), Electronic equipment, Electromagnetic waves, Reports, Scientific research, Instrumentation.

AD-609 260 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE, TYPE 2N1814 SILICON ALLOY TRANSISTOR.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 64,
by T. E. Ebert, R. J. Pisarcik, and W. E. Shopsky.
30 Sep 64, 25p
Contract DA36 039AMC03617E

Unclassified report

See also AD-601 676.

Descriptors: (*Transistors, Manufacturing methods), Silicon alloys, Production, Industrial equipment, Engineering, Design, Life expectancy, Reliability (Electronics).

The status of all of the process improvements is presented. Two phases of the program are reported as terminated due to the negative results obtained during the course of investigation. Progress and data are presented for the pulsed peak power test program. Additional life test data are presented for standard 2N1814 production units. (Author)

AD-609 263 Div. 8
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
HIGH POWER DUMMY LOAD.
Quarterly rept. no. 1, 30 Jun-30 Sep 64,
by I. N. Mindel, T. Shaifer, A. Mountvala, and L. Wolf.
30 Sep 64, 55p IITRI-E6028
Contract DA28 043AMC00300E, Proj. 1Gb41209D536

Unclassified report

Descriptors: (*Dummy loads, Design), Broadband, Radiofrequency pulses, Continuous wave radar, Resistors.

The primary object is the design and fabrication of advanced developmental models of dry, unbalanced non-radiating broadband dummy loads capable of dissipating CW or pulsed RF energy of 100 watts and one kilowatt average levels. The loads so designed are to have reduced physical dimensions over loads which presently represent the state of the communications art. The secondary object is the preparation of design plans for loads having a capability for dissipating CW or pulsed RF energy of 10 and 50 kilowatt average levels. A tentative design for a 1 kw dry load was completed. Theoretical and experimental studies of the various portions of the load indicate that the basic concepts are feasible. R. F. and thermal analysis predict load sizes may be scaled without basic difficulty. Experimental work done on a thermal mock-up of a 1 kw size load show that the temperatures attained by the various portions of the load are in close agreement with the predicted values. Test on carbon film elements for the 100 watt size load indicate no serious difficulties with the small units.

AD-609 279 Div. 8, 25, 30
OTS Prices: HC $4.00/MF $1.00

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME IIIB: SIMULATED-USE LIFE-TEST DATA (DIODES).
Final rept., Vol. 3B, 30 Apr 56-31 Mar 58,
by J. E. Brennan, A. E. Mace, L. H. Stember, Jr., R. L. Smith, and K. E. Hassler. 31 Mar 58, 140p
Contract AF04 645 20

Unclassified report

Subcontracted to Battelle Memorial Inst., Columbus, Ohio.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronic equipment, Digital computers), (*Diodes (Semiconductor), Reliability (Electronics)), (*Computers, Diodes (Semiconductor)), Simulation, Failure (Mechanics), Statistical analysis, Design, Operation, Maintenance, Germanium, Life expectancy, Stresses, Voltage, Temperature, Probability, Test methods.

Presentation of Type HD2193 diode data for the simulated-use load-life experiment was designed to provide summarized statistics that could be used in a variety of computations which might arise in the design, operation, and maintenance of a ground-based computer system.

AD-609 284 Div. 8, 5
OTS Prices: HC $4.00/MF $1.00

Jansky and Bailey Div., Atlantic Research Corp., Washington, D. C.
TROPICAL PROPAGATION RESEARCH.
Semiannual rept. no. 1, Jul-Dec 62.
Jan 63, 137p
Contract DA36 039SC90889

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radio waves, Tropical regions), (*Tropical regions, Radio waves), (*Propagation, Radio waves), Theory, Test equipment, Transmitter-receivers, Antennas, Measuring devices (Electrical and Electronic), Power supplies, Environmental tests, Jungles, Communication equipment.

The basic concepts of the theoretical and experimental studies of radio propagation in jungle environments are reviewed. Results of a survey of literature pertaining to radio propagation in tropical areas and propagation over rough terrain are included. The details of a site survey are presented and describe, to a certain extent, the environment in which the proposed tests will be conducted. A discussion of the tests planned includes a description of the measurements, test equipment and measurement techniques. The theoretical studies required to fulfill the requirements of the contract are summarized and presented along with the results accomplished to date. A theoretical analysis of the quadrant dipole antenna is included in the appendix. (Author)

AD-609 285 Div. 8, 5
OTS Prices: HC $3.00/MF $0.75

Jansky and Bailey Div., Atlantic Research Corp., Washington, D. C.
TROPICAL PROPAGATION RESEARCH.
Semiannual rept. no. 2, Jan-Jun 63.
Jun 63, 84p
Contract DA36 039SC90889

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Radio waves, Tropical regions), (*Tropical regions, Radio waves), (*Propagation, Radio waves), Terrain, Mathematical models, Thailand, Jungles, Transmissions, Attenuation, Test equipment, Antennas, Measuring devices (Electrical and Electronic), Powers supplies, Environmental tests, Communication equipment.

During the period of this report considerable effort was devoted to the preparation of the equipment to be used in the conduct of the field measurements, the detailed planning necessary to initiate site construction, and the preparation of a mathematical model for calculating rough terrain path loss in the absence of foliage for each of the possible propagation modes. This report presents a summary of the work completed to date. The problem of classifying the tropical environment is reviewed, and an initial classification containing five divisions is presented. Undoubtedly when the six study areas established for this phase of the program are completed the original classification system will be modified. The results of a study intended to determine accurate propagation prediction methods for the several possible propagation modes are presented with a discussion of the prediction methods. The conclusions reached are applicable to a major portion of the frequency range of interest. (Author)

AD-609 286 Div. 8, 5
OTS Prices: HC $4.00/MF $1.00

Jansky and Bailey Div., Atlantic Research Corp., Washington, D. C.
TROPICAL PROPAGATION RESEARCH.
Semiannual rept. no. 3, Jul-Dec 63.
Dec 63, 133p
Contract DA36 039SC90889

Unclassified report

Descriptors: (*Radio waves, Tropical regions),

(*Tropical regions, Radio waves), (*Propagation, Radio waves), Transmissions, Attenuation, Terrain, Mathematical models, Thailand, Jungles, Antennas, Powers supplies, Environmental tests, Communication equipment, Test equipment, Tests.

A method has been developed for classifying tropical vegetation into five visually recognizable divisions in accordance with the shape characteristics of each division. The real purpose of such a classification system is to allow the observer to roughly measure the variety of growths that may be encountered in tropical regions in relation to communication problems. It remains in the next step to develop units of numerical measure for each of these classifications so that the effects of vegetation can be numerically related to propagation prediction techniques. In the course of developing instrumentation suitable for the performance of the field measurements under extreme environmental conditions, it was necessary to develop and fabricate several special purpose items. This report presents some of the details of these special items of equipment. (Author)

AD-609 292 Div. 8
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Lab., Corona, Calif.
RECEPTION PATTERNS OF VLF WAVE ANTENNAS AT OPTIMUM LENGTHS,
by E. W. Seeley and V. D. Kamp. 15 Oct 64, 34p
NOLC 610

Unclassified report

Descriptors: (*Antennas, Very low frequency), (*Antenna radiation patterns, Very low frequency), Performance (Engineering), Optimization, Antenna lobes, Graphics, Antenna configurations, Design.

The report presents an analytical study of the horizontal pattern characteristics of the wave antenna at the first, second, and third optimum lengths. The reception patterns depend entirely upon the antenna loss and the wave velocity along the antenna. Curves are presented to show the heights and depths of the side lobes and nulls in the antenna patterns. These curves may be used to design wave antennas with prescribed side lobes and beamwidths. (Author)

AD-609 304 Div. 8, 12, 25
OTS Prices: HC $1.00/MF $0.50

Sylvania Electric Products, Inc., Waltham, Mass.
RADIATION FROM AN ELECTRIC DIPOLE IN A PLASMA COLUMN.
Scientific rept. no. 4,
by S. R. Seshadri. 7 Aug 64, 24p S-3040-4
Contract AF19 628 2410, Proj. 4642, Task 464202
AFCRL 64 695

Unclassified report

Descriptors: (*Antenna radiation patterns, Satellite antennas), (*Plasma sheath, Antenna radiation patterns), (*Satellite antennas, Antenna radiation patterns), Plasma medium, Plasma physics, Dipole antennas, Antennas, Dipole moments, Magnetic fields, Electric moments, Electromagnetic waves, Excitation, Vector analysis, Bessel functions, Partial differential equations, Integration, Differential geometry.

The radiation characteristics of an axially oriented electric dipole in an isotropic plasma column are investigated. Surface waves are found to be excited for frequencies less than 1/ square root of 2 times the plasma frequency. The dependence of the power carried by the surface as well as the space wave, on the frequency and the radius of the plasma column are examined. The surface waves are found to be excited with maximum efficiency in the neighborhood of 1/2 times the plasma frequency. The radiation pattern in the far-zone is evaluated and found to have, in general, a maximum in the broadside and a null in the end-fire directions. The normalized radiation resistance is found to vary as the square of the frequency for small column dimensions and for high frequencies. (Author)

AD-609 312 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Weston Instruments, Inc., Newark, N. J.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-127 DATED 9 FEBRUARY, 1962.
Quarterly progress rept. no. 8, 1 Apr-30 Jun 64.
30 Jun 64, 32p
Contract DA36 039SC86734

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.
See also: AD-607 096.

Descriptors: (*Variable resistors, Manufacturing methods), Metal films, Resistance (Electrical), Failure (Mechanics), Life expectancy, Performance (Engineering), Military requirements, Production, Test equipment, Electric insulation, Thermal stresses, High-temperature research.

Twenty (20) 50K units were placed on load life test to determine if the new end insulator 244500 made with a high-temperature material (Rolube) would meet the load life requirement of SCL-6111. (One per cent change at 125C with 1/2 watt for 1000 hours.) All units stayed within two per cent, with eleven (11) staying within one per cent. Twenty (20) 200K units were tested similarly to the above. All units stayed within two per cent, with thirteen (13) staying within one per cent. It was requested that the SCL-6111 specification be changed to MIL-R-22097B, Condition E, for spiral units, and Condition C for toroids. A complete review of the project indicated a changeover to MIL-R-22097B was possible. Ten (10) 50K units were placed on load life test to evaluate MIL-R-22097B, Condition E (one per cent change at 85°C with 1/2 watt for 1000 hours) and they have stayed well within 1/2 per cent. The toroid contact holder 244547 was produced with excellent results on centering of the groove; however, the entire lot was rejected for incorrect tap drill size. These parts have been re-ordered.

AD-609 313 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Weston Instruments, Inc., Newark, N. J.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-127 DATED 9 FEBRUARY, 1962, AND MIL-R-22097B (MODIFIED).
Quarterly progress rept. no. 9, 1 Jul-30 Sep 64.
30 Sep 64, 50p
Contract DA36 039SC86734

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.
See also: AD-609 312.

Descriptors: (*Variable resistors, Manufacturing methods), Metal films, Resistance (Electrical), Failure (Mechanics), Life expectancy, Performance

(Engineering), Military requirements, Production, Test equipment, Electric insulation, Thermal stresses, Epoxy plastics, High-temperature research.

Favorable load life data on 50K units was obtained when the load life temperature was reduced from 125C (old SCL-6111 requirement) to 85C (new MIL-R-22097B requirement). Favorable data has been obtained for the following additional characteristics: Load life to 2000 hours (50K units), High temperature exposure, Thermal cycling, and T.C. to 60 ppm (5K units). The fit of the contact holder in 10 and 25 turn units has been improved correcting a mechanical assembly problem. Although substitution of Rolube for the teflon insulators had corrected the problem of shift during final encapsulation, the source was found to be unreliable. A replacement for the Rolube has been found by molding the parts of Fiberite epoxy resin. This is being done in house in a test mold with satisfactory results. A production mold will be ordered. A change in pin material (still within the contract requirements) has been made from silver plated copper to gold plated nickel. This was done to make one unit compatible with users employing both printed circuit soldering and welded modules.

AD-609 321 Div. 8, 5
OTS Prices: HC $1.00/MF $0.50

Philco Corp., Palo Alto, Calif.
RELIABILITY DESIGN REVIEW OF MIXER-FILTER MX-7.
30 Sep 60, 20p WDL-TR1369
Contract AF04 647 532

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Mixers (Electronic), Reliability (Electronics)), (*Space communication systems, Mixers (Electronic)), Filters (Electromagnetic wave), Noise (Radio), Circuits, Life expectancy, Stresses, Design, Airborne, Communication equipment, Failure (Mechanics).

The design of the MX-7 Mixer-Filter Unit is reviewed. The MX-7 differs from the MX-5 version (which it replaces) only by the addition of noise gate circuitry. The noise gate introduces an additional 15 component parts in a total of 252 parts required for the complete unit. The MTTF of the MX-7 is predicted to be 6300 hours based on component part failure-rate data available in applicable literature. Electrical stress level measurements and a specified ambient operating temperature of 55C are taken into account in selecting the failure rate figures. Necessary circuit complexity prohibits the attainment of the MTTF design goal of 20,000 hours. In the previous design review of the MX-5, it was recommended that the 50,000 ohms Bourns Trim Pot be replaced with one of less than 20,000 ohms resistance because of the fragility of the fine wire required for the higher resistance. A similar design weakness exists in the MX-7 Mixer-Filter. All component parts were found to be operating well below the maximum rated stress-level specified by the various manufacturers. However, a statement on the acceptability of the Mixer-Filter Unit by the Reliability Assurance Staff cannot be made until all questionable component parts have been qualified. (Author)

AD-609 326 Div. 8, 1, 33
OTS Prices: HC $3.00/MF $0.75

HRB-Singer, Inc., State College, Pa.
DESIGN AND DEVELOPMENT OF AIRBORNE RADIO INTERFERENCE LOCATOR.
Final engineering rept. Phase I,
by J. L. Woika. Sep 64, 80p
Contract FA WA4448, Proj. 541 1N
FAA RD64 105

Unclassified report

Descriptors: (*Interference analyzers, Radio-frequency interference), (*Radiofrequency interference, Interference analyzers), Airborne, Electronic equipment, Detection, Identification systems, Antennas, Radio receivers, Display systems, Radio interference, Navigational aids, Air traffic control systems, Human engineering, Flight testing, Design, Specifications.

This report describes engineering effort to develop an airborne system to detect, identify, and locate sources of radio frequency interference to FAA air navigation aids. Major design decisions are described and the final feasibility equipment is described in detail. Results of initial test flights are tabulated. The RFI detection and location system is designed to operate over the VOR-VHF communications, glide slope, and TACAN frequency bands. Groups of scanning receivers and a display console permit a panoramic display of radio frequency spectrum of the bands of interest. Pairs of direction-finding antennas are included in the system to provide a capability of homing on emitters of undesired signals to obtain their location. This information may be recorded and used by ground vans for later final location. Results of initial flight tests indicate that the system will locate a target emitter well within the design goal. (Author)

AD-609 362 Div. 8
OTS Prices: HC $1.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
FOUNDATIONS OF INFORMATION THEORY,
by A. J. Thomasian. Oct 64, 6p ERL-64-38
Contract Nonr22253, Proj. NR049 124

Unclassified report

Descriptors: (*Communication theory, Reviews), Probability, Theorems, Bibliographies.

Since 1959 a considerable amount of American research has been published on the foundations of the theory created by Shannon in 1948. This survey is mainly restricted to extensions of Shannon's original results to communication models which incorporate new phenomena. Some attention is also being given to generalizations of the Shannon-McMillan theorem and to finite-state channels.

AD-609 365 Div. 8
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Owensboro, Ky.
LOW-POWER, X-BAND, PLATE-PULSED OSCILLATOR.
Rept. no. 5 (final), 1 Feb 63-30 Jun 64,
by J. M. Connelly and J. R. Peterson. 30 Jun 64, 95p
Contract DA36 039AMC00132E, Task 1G6 22001A055 02

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also: AD-601 476.

Descriptors: (*Microwave oscillators, X-band), (*Triodes, X band), Cavity resonators, Cathodes (Electron tubes), Nickel alloys, Tungsten alloys, Ceramic coatings, Electromagnetic pulses, Performance (Engineering), Life expectancy, Frequency shift, Design.

A triode/cavity oscillator capable of 50 watts of pulse power output and tunable with one knob tuning over a frequency of 9.2 to 9.6 Gc was designed and 10 of the units were built and evaluated for initial performance. Desirable features of the oscillator are its small size, light weight (approximately 1 oz), and its low power consumption. The filament power is approximately 1.3 watts and the average plate power is approximately 0.75 watts (e sub b = 1500 V, i sub p = 800 ma, % duty = 0.05). Twelve tube designs totaling approximately 215 tubes were made and evaluated during the program. The basic problem encountered was insufficient peak emission (J approximately 40 A/square cm) in tubes at a reasonable cathode temperature. Triodes of the final design, type Y-1249-N, have adequate emission for initial oscillator performance within specification limits. However, the probability of meeting the 500-hour life before the output drops 3 db is undetermined since the contract time and funding limitations did not allow for the additional life tests. (Author)

AD-609 379 Div. 8, 30
OTS Prices: HC $5.00/MF $1.00

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASE COMPUTER SYSTEMS.
Quarterly progress rept. no. 2, 1 Jun-31 Aug 56, 31 Aug 56, 159p
Contract AF04 645 20

Unclassified report

Subcontracted to Inland Testing Labs., Chicago, Ill.
Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Digital computers, Electronic equipment), (*Electronic equipment, Reliability (Electronics)), (*Test facilities, Electronic equipment), Computers, Test sets, Data, Automation, Resistors, Diodes, Transistors, Tests, Life expectancy, Environmental tests, Quality control, Failure (Mechanics), Statistical analysis.

Inland Testing Laboratories, in its Reliability Test Section, is designing and constructing a test facility for simultaneously testing more than 70,000 resistors, diodes and transistors, plus a substantial, but not yet determined quantity of other components. The quantities of components to be tested are extremely large and test measurements are to be made frequently; therefore a conventional test system, using manual techniques for operation and measurement, is totally impractical. For this reason, a fully automated reliability test facility with provision for data-taking and recording is being designed. A program of Acceptance Testing is also being undertaken. This program includes the testing of a sampling of components from each lot manufactured, to verify compliance with Univac's component specifications. Related to, yet separate from the Acceptance Testing Program, is a program of Vendor Surveillance. This activity is conducted by Inland at vendors plants and includes observation of manufacturing processes, collection of data related to performance, characteristics, establishment of a system of lot identity and observation of the vendors acceptance test procedures. (Author)

AD-609 381 Div. 8
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
SOME EFFECTS OF EXPLODING PHOTOFLASH BOMBS ON THE TRANSMISSION OF RADIO WAVES,
by Lawrence Baylor Robinson. 26 Nov 56, 29p
GM-TR-97
Contract AF18 600 1190

Unclassified report

Descriptors: (*Photoflash bombs, Radiofrequency interference), (*Radiofrequency interference, Photoflash bombs), Pyrotechnics, Explosion effects, Radio interference, Radio transmission, Photoflash ammunition, Barium compounds, Potassium compounds, Nitrates, Chlorates, Aluminum, Vapors, Spheres, Electromagnetic wave reflections, Attenuation.

The explosion of a specific photoflash powder is considered as a simple chemical reaction. The composition of the powder is 30% Ba(NO3)2, 30% KClO4, 40% Al. The temperature of the reaction is calculated to be 4000K and the pressure developed is 6000 atmospheres. The initial Saha equilibrium electron density developed is 10 to the 20th power electrons/cc. These electrons, uniformly distributed in a spherical cloud of aluminum vapor and nitrogen (gaseous explosion products), would make such a sphere (up to 10 ft radius) opaque to radio waves of frequencies up to 10,000 megacycles/sec. For such frequencies, the ratio of flux incident upon the cloud of radius a to that scattered a distance R away is roughly S sub I/S sub S = 1/4 (a/R) to the 2nd power. For large radii, the attenuation and reflection coefficients can be determined. (Author)

AD-609 396 Div. 8, 12
OTS Prices: HC $1.00/MF $0.50

Bendix Corp., Southfield, Mich.
EXPLORATORY DEVELOPMENT OF THE Q-FACTOR TECHNIQUE. SECTION 1 - RESULTS AND DISCUSSION OF FIRST NEUTRON TEST.
Quarterly progress letter no. 3,
by Max Frank. 15 Dec 64, 20p RLD-2797
Contract AF29 601 6316, Proj. 4400

Unclassified report

Descriptors: (*Transistors, Radiation damage), Gain, Space environmental conditions, Neutrons, Environmental tests, Temperature, Electric currents, Voltage, Test methods.

This report presents damage constant comparisons for 2N1613 transistors irradiated both passively and in several operating conditions in a neutron environment of 7 x 10 to the 13th power n/sq cm, E > 0.1 Mev. Comparisons of damage are also made for three different temperatures during irradiation and three different measurement temperatures to determine the influence of each temperature condition. The damage constant behavior for 2N709, 2N914 and 2N1613 transistors was investigated at different levels of measurement current, from 0.00001 a to 0.1 a. (Author)

AD-609 402 Div. 8, 2
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
SOME METHODS FOR WORLD-WIDE ATMOSPHERIC RADIO DUCT MEASUREMENT AND PREDICTION,
by D. L. Randall. Jun 64, 14p

Unclassified report

Reprinted from Report of NRL Progress, June 1964, AD-602 948, PB-181 563.
Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Radio waves, Ionospheric propagation), (*Ionospheric propagation, Radio waves), Meteorological

parameters, Atmosphere, Ducts, Waveguides, Radio transmission, Very high frequency, Ultrahigh frequency, Marine meteorology, Air mass analysis, Electromagnetic waves, Wave transmission, Measurement, Mathematical prediction.

Vorticity fields showing areas of divergence or convergence in the air-mass flow channels at or above the gradient wind level may be located on a weather map and are theoretically related to the formation or dissipation of elevated radio ducts at vhf and uhf. Theoretical predictions of elevated radio duct formation have been verified by measurements made on a trip around the world, February 8 to March 15, 1962, in a Naval Research Laboratory aircraft. On the basis of this theory and the meterological measurements, oceanic regions in the world most likely to support radio duct formation at different seasons of the year indicated. (Author)

AD-609 411 Div. 8
OTS Prices: HC $4.00/MF $0.75

IIT Research Inst., Chicago, Ill.
STUDY OF COMPREHENSIVE FAILURE THEORY.
Interim rept. for 28 Feb - 25 Jun 64,
by M. E. Goldberg, F. R. Hand, A. Horberg, H. A. Lauffenburger, and D. W. Levinson.
Nov 64, 104p IITRI-E6006-11
Contract AF30 602 3251, Proj. 5519, Task 551906
RADC TDR64 443

Unclassified report

Descriptors: (*Resistors, Failure (Mechanics)), (*Failure (Mechanics), Resistors), (*Metal films, Failure (Mechanics)), Reliability (Electronics), Nickel alloys, Chromium alloys, Aluminum alloys, Copper alloys, Phase studies, Oxidation, Dynamics, Mathematical models, Least squares method, Numerical analysis, Thickness, Semiconductor devices, Diodes (Semiconductor), Silicon.

Studies of failure mechanisms in metal film resistors are reported. Oxidation and precipitation are the principal first order mechanisms responsible for changes in resistance with time and temperature. It is shown that the gamma phase (Ni3A1 structure) precipitates in the thin films studied in a metallurgically consistent way. Oxidation has been seen to consist of particulate growth, with some evidence that film growth also occurs. Kinetics for the different processes appear to be distinctly different. With a region of essentially no change appearing to correspond to uniform oxide growth. The processes investigated have been applied to the mathematical model of resistor behavior. The basic model is in process of revision to account for such factors as non-uniform film thickness, plaque oxidation, etc. Approximations to account for these processes are presented. (Author)

AD-609 420 Div. 8, 15, 30, 32
OTS Prices: HC $4.00/MF $1.00

Systems Research Center, Case Inst. of Tech., Cleveland, Ohio.
THE CONCEPT OF FINITE REPRESENTABILITY,
by Edward B. Altman. 1964, 155p
SRC-56-A-64-20
Grants AF AFOSR125 63, NSF GP642
AFOSR 64 2408

Unclassified report

Descriptors: (*Communication theory, Language), (*Language, Communication theory), (*Mathematical models, Communication theory), Programming languages, Vocabulary, Theorems, Algebra, Computers, Control sequences.

A subclass of the context-free grammars is developed which is based solely upon the structural properties of the grammars. This subclass is utilized in the development of a partial hierarchy of the entire class of context-free grammars. In turn, this hierarchy makes possible the extension of certain information theory measures beyond the classical finite state limitations. Various restriction upon the method of generating sentences are introduced and the consequences of these restrictions are studied, in a general way, using mainly the introduced notion of production indexing sets. (Author)

AD-609 425 Div. 8, 12, 25
OTS Prices: HC $3.00/MF $0.75

TRW Space Technology Labs., Los Angeles, Calif.
CIRCUIT DESIGN FOR A SOLID STATE DIGITAL TIMER-PROGRAMMER,
by William F. Shoop. Apr 60, 63p
STL/TN-59-0000-00357

Unclassified report

Descriptors: (*Timing devices, Control systems), (*Spacecraft, Control systems), Guidance, Guided missiles, Special purpose computers, Packaging, Environmental tests, Mathematical analysis, Relaxation oscillators, Trigger circuits, Relays, Gates (Circuits), Printed circuits, Diodes (Semiconductors), Digital systems.

An experimental study was made of an all-electronic timer-programmer for missile and space vehicle applications. The circuitry is described in detail; packaging and testing of a prototype unit are discussed. Circuit diagrams and mathematical derivations are also presented. (Author)

AD-609 429 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPROXIMATE CONFIDENCE LIMITS FOR THE RELIABILITY OF SERIES AND PARALLEL SYSTEMS,
by Albert Madansky. Dec 64, 20p RM-2552-1-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.
See also AD-237 790.

Descriptors: (*Statistical analysis, Reliability (Electronics)), (*Reliability (Electronics), Statistical analysis), Electrical networks, Networks, Failure (Mechanics), Series, Probability, Stochastic processes, Statistical functions, Linear programming.

A complex mechanism, e. g., a missile, can be built up from a number of different types of components, where the reliability of each of the components has been estimated by means of separate tests on each of the components. This Memorandum gives a method for combining such data to determine approximate confidence limits for the reliability of the complete mechanism. More precisely, a method of determining approximate confidence limits for the reliability of series, parallel, and series-parallel systems is given, based on observed failures of the individual components. It is assumed that the failures are independent, and that failures of a given component follow a binomial distribution with unknown parameter, the component reliability. The large-sample properties of the likelihood-ratio test are then used to construct the appropriate confidence limits for the system reliability. (Author)

AD-609 431 Div. 8, 6
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.

A CLASS OF SIGNAL PROCESSING PROCEDURES SUGGESTED BY STATISTICALLY OPTIMUM PROCEDURES, by P. Swerling. Nov 64, 50p P-3029

Unclassified report

Descriptors: (*Communication theory, Statistical analysis), (*Numerical methods and procedures, Communication theory), Signal-to-noise ratio, Statistical processes, Satellites (Artificial), Orbital trajectories, Position finding.

This paper investigates a class of data-smoothing procedures for use in problems where the objective is to estimate a set of parameters, on the basis of observed data which depend on these parameters and are also corrupted by noise. These procedures are in part motivated by possible application to orbit estimation problems, which the author believes may provide instances where the suggested procedures are computationally more convenient than those more commonly employed. However, potential applications exist to many other parameter estimation problems. Some of the results are of general interest to parameter estimation theory.

AD-609 432 Div. 8
OTS Prices: HC $3.00/MF $0.75

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
THE REFLECTING BEAM WAVEGUIDE, by James E. Degenford. Oct 64, 84p
Contract AF30 602 3046, Proj. 4505, Task 450501
RADC TDR64 429

Unclassified report

Continuation of Contract AF30 602 2456.

Descriptors: (*Millimeter waves, Waveguides), (*Waveguides, Millimeter waves), (*Reflectors, Waveguides), Optical equipment, Aluminum, Foils, Wave transmission, Waveguide couplers, Resonators, Electromagnetic waves, Equations, Theory.

A type of beam waveguide which uses appropriately shaped metal reflectors instead of dielectric lenses as the phase correcting devices is described. A theory has been developed which, subject to certain restrictions, describes the modes of this type of beam waveguide and predicts a loss of the order of 0.01 db per iteration. A reflecting beam waveguide comprising eight aluminum reflectors has been investigated at a wavelength of 4 millimeters. The measured loss per iteration is approximately 0.015 db which is in good agreement with the theoretical value. The cross sectional electric field distribution has also been measured and found to be in satisfactory agreement with the theory. A convenient and inexpensive technique for constructing the reflectors from commercially available metal foils is described. It is shown that the reflecting beam waveguide is a practical system for the transmission of power at submillimeter wavelengths. (Author)

9. Fluid Mechanics

AD-609 013 Div. 9, 30
OTS Prices: HC $6.00/MF $1.25

Norair Div., Northrop Corp., Hawthorne, Calif.
NUMERICAL METHODS AND FORTRAN PROGRAM FOR FLOW FIELD CALCULATIONS IN SUPERSONIC CASCADES.
Final rept.,
by J. Der, Jr. and B. N. Mullings. Oct 64, 229p
NOR-64-105
Contract AF33 657 8851, Proj. 7065, Task 7065 01
ARL 64 146

Unclassified report

Descriptors: (*Programming languages, Supersonic flow), (*Supersonic flow, Numerical analysis), (*Numerical methods and procedures, Fluid mechanics), Blunt bodies, Shock waves, Boundary layer, Viscosity, Fluid dynamic properties, Laminar boundary layer, Axially symmetric flow, Flow visualization, Friction, Geometry, Equations, Programming (Computers), Differential equations, Fluid flow.

The results presented in this report are a continuation of the work reported earlier in ARL 63-117. This report describes methods and an IBM FORTRAN II program for the calculation of internal viscous and inviscid flow fields within the channels of a supersonic cascade. Methods included are: (1) a second order Belotserkovskii procedure for calculating the flow field around the forward part of blunt blades, (2) a general method of characteristics procedure for calculating supersonic flow fields, (3) automatic procedures for calculating interactions of shocks of the same and opposite families, shock interactions with a wall and with a vortex sheet or slipstream, envelope shock formation, and (4) a finite-difference procedure for calculating the laminar boundary layer, which includes a method of suction calculation for maintaining a non-separated boundary layer under an adverse pressure gradient. (Author)

AD-609 054 Div. 9
OTS Prices: HC $3.00/MF $0.75

Systems Research Labs., Inc., Dayton, Ohio.
HYPERSONIC FLOW OVER BLUNT SLAB WINGS WITH SWEEP ANGLES FROM 0 TO 70 DEGREES.
Interim technical rept. for Aug 63-Jun 64,
by W. D. Vann. Oct 64, 99p
Contract AF33 616 7987, Proj. 7065, Task 706501
ARL 64 171

Unclassified report

Descriptors: (*Hypersonic flow, Swept wings), (*Swept wings, Hypersonic flow), Blunt bodies, Pressure, Distribution, Hypersonic wind tunnels, Angle of attack, Reynolds number, Models (Simulations), Two-dimensional flow, Shock waves, Theory, Experimental data, Fluid flow, Tests.

An experimental and theoretical investigation was made to determine the pressure distributions over swept wings in hypersonic flow. Two models having hemicylindrical leading edges were tested in the Aerospace Research Laboratories' 20-inch hypersonic wind tunnel. Tests were made over an angle-of-attack range of ±25 degrees at five-degree increments for the sweep angles 0, 50, 60, and 70 degrees at a nominal test Mach number of 14 and a Reynolds number of 35,000 based on the nose diameter of the models. The test data measured on the nose region was in fair agreement with the theoretical pressure distributions for each sweep angle and appeared to be independent of Mach number as expected. At angles of attack up to 15 and 25 degrees, the flow over the expansion and compression surfaces appeared to be two-dimensional. Fairly good agreement was obtained between the measured test data and an inviscid theoretical analysis based on a modification of the blast wave theory. (Author)

AD-609 099 Div. 9, 27
OTS Prices: HC $4.00/MF $1.00

Naval Postgraduate School, Monterey, Calif.
AN ELECTRICAL ANALOGY FOR ANALYSIS OF FLOW THROUGH CASCADES.
Master's thesis,
by Frank R. Fahland and Larry L. Hawkins. 1958, 135p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Fluid flow, Axial-flow turbines), (*Analog systems, Fluid flow), Conformal mapping, Test methods, Transformations (Mathematics), Airfoils.

A method of analysis of arbitrary cascades under conditions of ideal fluid flow is described. The method is based on conformal transformation, achieved experimentally through an electrical analogy. Tests were conducted to permit comparison of results obtained by this method with those of a previous analytical solution and with NACA two dimensional cascade tests. Results indicate that the quick and inexpensive procedure of this method is applicable to engineering problems of cascade analysis. (Author)

AD-609 148 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CHANNELED BODIES STREAMLINED WITH FLAT AND CONIC SHOCK WAVES,
by V. V. Keldysh. 18 Nov 64, 8p
FTD TT64 1189; TT 65 60448

Unclassified report

Unedited rough draft trans. of Inzhenernyi Zhurnal (USSR) 1964, v. 4, no. 3, p. 539-542.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerodynamic configurations, Supersonic flow), (*Shock waves, Geometric forms), Axially symmetric flow, Supersonic flight, Conical bodies, Surfaces, USSR.

Consideration is given to examples of precise solutions for external flow around channeled bodies with supersonic velocities at the inlet to the internal channel, and the corresponding coefficients are calculated. Two classes of bodies are investigated: (1) bodies consisting of flat faces and streamlined over the design regime with the formation of flat, attached shock waves, (2) axisymmetric bodies for which external flow is conic.

AD-609 150 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ANALYTIC INVESTIGATION OF TURBULENT FLAT

JET, DEVELOPING IN A CO-STREAM,
by E. Timma. 23 Nov 64, 22p
FTD TT64 359; TT 65 60450

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Estonskoi SSR, Tallinn. Izvestiya. Seriya Fiziko-Matematicheskikh i Tekhnicheskikh Nauk, 1963, v. 12, no. 1, p. 57-74.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Jets, Turbulence), (*Jet mixing flow, Mathematical analysis), Gas flow, Integral equations, USSR.

With the help of the proposed method, analytic formulas were obtained for determination of the characteristics of all sectors of a turbulent plane-parallel jet, which developed in a co-stream.

AD-609 271 Div. 9, 13
OTS Prices: HC $3.00/MF $0.75

Hydrodynamics Lab., Mass. Inst. of Tech., Cambridge.
WAVE REFLECTION AND TRANSMISSION IN CHANNELS OF GRADUALLY VARYING DEPTH.
Rept. no. 72,
by A. T. Ippen, A. M. Z. Alam, and E. L. Bourodimos. Jul 64, 80p MIT-DE-R64-31
Contract Nonr184159, Proj. 8228

Unclassified report

Descriptors: (*Water waves, Hydrodynamics), Rectangular bodies, Tanks (Containers), Energy, Tables, Analysis of variance, Transport properties.

For short and intermediate waves reflection coefficients become generally larger than predicted as the slope of the transition decreases. For short and intermediate waves transmission coefficients generally agree with predictions for group velocity ratios near unity, but tend to lower values for lower ratios of group velocity as the slope of the transition decreases. For short and intermediate waves wave steepness has a relatively small influence on reflection and transmission coefficients. For shallow water waves the reflection coefficients were found independent of relative depth ratios contrary to prediction but decreased markedly with increasing wave steepness for the smallest slope. For shallow water waves the transmission coefficients followed the predicted trend, but became relatively lower for increasing relative depth ratios. Increasing wave steepness had the effect of increasing the transmission coefficients for the smallest slope. (Author)

AD-609 274 Div. 9, 12, 25
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
AEROMECHANICS PROGRAM. DYNAMICS RESEARCH PROGRAM.
Semiannual technical rept. for 1 Jul-31 Dec 61, comp. by W. P. Rodden. Apr 62, 46p
TDR-930(2230-09)TR-1
Contract AF04 647 930
DCAS TDR62 91

Unclassified report

Descriptors: (*Aerodynamic characteristics, Scientific research), (*Mechanics, Reviews), Dynamics, Aeroelasticity, Aerodynamic loading, Structures, Fatigue (Mechanics), Guided missiles, Spacecraft, Theory, Lift, Abstracting, Bibliographies, Numerical analysis.

Analytical research included studies in unsteady aerodynamics, aeroelastic analysis, elastodynamics, and fatigue of structures under random loading. Research in the last field, structural fatigue, consisted chiefly of a literature search and review, the results of which are included in the appendixes. Numerical research included the development of a number of computer programs to be used in aeroelastic analysis studies. (Author)

AD-609 407 Div. 9, 1, 30
OTS Prices: HC $7.00/MF $2.00

Litton Systems, Inc., Woodland Hills, Calif.
WIND TUNNEL CALIBRATION TESTS AND PRESSURE MEASUREMENTS ON A BLUNTED SLENDER CONE FROM MACH 1.5 TO 10.0,
by George K. Gardiner. Sep 64, 394p SMAD-1-4
Contract AF33 657 9327

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Nose cones, Aerodynamic characteristics), (*Blunt bodies, Slender bodies), Supersonic flight, Hypersonic flight, Wind tunnels, Atmosphere entry, Heat transfer, Models (Simulations), Instrumentation, Friction, Calibration, Tests, Pressure, Measurement, Data, Graphics, Design.

AD-609 416 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
DIRECT ENERGY CONVERSION SYSTEMS. SUPPLEMENT 1. HEAT AND MASS TRANSFER FROM THE SURFACE OF A CYLINDER WITH DISCONTINUOUS BOUNDARY CONDITIONS TO AN INCOMPRESSIBLE LAMINAR FLOW.
Quarterly technical summary rept. no. 4, suppl. 1, 1 Jun - 31 Aug 64,
by Zeev Rotem and David M. Mason. 30 Sep 64, 71p
Contract AF49 638 1123, ARPA Order 246
NP 14544

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy. See also AD-609 415.

Descriptors: (*Energy conversion, Scientific research), (*Transport properties, Fluid flow), (*Fluid flow, Cylindrical bodies), (*Two-dimensional flow, Heat transfer), Surfaces, Incompressible flow, Laminar flow, Boundary layer, Shear-stresses, Theory, Experimental data, Mathematical analysis, Boundary value problems, Thermal conductivity, Test equipment, Electrochemistry, Electrodes.

Heat and mass transfer studies for flow over a cylinder having a longitudinal-strip source of hear or mass, are presented. A theory for the two asymptotic cases of Pr6 approaches infinity and Pr approaches 0 is developed, giving the temperature profile and the transfer rate for such a strip. The theory includes the effect of the conductivity of the heating strip material. It is shown that if the conductivity of the strip material is very high, then the transfer rate is a measure of local wall shear-stress provided the Prandtl number of the convecting fluid is high. Experimental studies described include electrochemical mass-transfer studies carried out on a rotating cylindrical electrode carrier; and heat transfer studies carried out in an oil tunnel. Fair correlation between theory and experiment was found. (Author)

10. Fuels and Combustion

AD-609 303 Div. 10, 4, 27
OTS Prices: HC $1.00/MF $0.50

Rocket Power, Inc., Pasadena, Calif.
STUDY OF ROCKET ENGINE EXHAUST PRODUCTS,
Quarterly rept. no. 13, 1 Jun-31 Oct 64,
by M. A. Greenbaum, R. E. Yates, J. A. Blauer, M. A. Frisch, and M. Arshadi. 31 Oct 64, 25p
Contract AF04 611 7414

Unclassified report

Descriptors: (*Rocket propellants, Combustion products), (*Exhaust gases, Thermodynamics), (*Thermodynamics, Rocket propellants), Beryllium compounds, Flourides, Dissociation, Energy, Enthalpy, Entropy, Heat of sublimation, Vapor pressure, High-temperature research, Solid rocket propellants, Liquid rocket propellants, Hybrid rocket propellants, Chemical equilibrium, Mathematical analysis.

Determination of the vapor pressure curve for BeF2(s) between 713 and 793K by means of the torsion effusion technique has led to values of 58.1 ± 0.7 kcal/mole and 47.8 ± 0.9 cal/degree/ mole for the enthalpy and entropy of sublimation of this material at 298K. Combination of these values with previously reported values for the enthalpy and entropy of vaporization of BeF2 leads to values of 1.6 ± 0.8 kcal/mole and 4.2 ± 1.1 cal/degree/mole for the enthalpy and entropy of fusion of BeF2 at its melting point (815K). Employing a new experimental technique and a new method of data analysis the dissociation energy of the F2(g) molecule at 298K has been found to be 41.1 kcal/mole. This value essentially substantiates a number of previously reported values in the 37-40 kcal/mole region. (Author)

11. Ground Transportation Equipment

AD-609 346 Div. 11
OTS Prices: HC $1.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PERFORMANCE TESTING OF AN AUTOMATIC SNOW LEVELER,
by Gunars Abele. Nov 64, 16p
CRREL SR68

Unclassified report

Descriptors: (*Snow removal, Automatic), (*Snow vehicles, Performance (Engineering)), Snow, Trafficability, Roads, Runways, Greenland, Feasibility studies.

A modified Gurries Automatic Road Builder was tested at the Keweenaw Field Station, Houghton, Michigan and in Greenland to determine its feasibility for leveling snow and producing trafficable snow surfaces, such as roads and runways in deep snow areas. The unit, a tow-type, hydraulically controlled, automatic leveler normally used for accurate, finish leveling in highway and airfield construction work, had been modified for use in snow. The initial performance test results were very satisfactory. A few minor modifications were required, which were performed before the completion of the initial tests. The final performance tests were conducted in Greenland and consisted of trail and runway improvement and maintenance work. It was determined that the Gurries Automatic Road Builder can be used quite effectively for snow road and trail improvement and maintenance, and is especially well suited for snow runway leveling. (Author)

12. Guided Missiles

AD-608 928 Div. 12, 22
OTS Prices: HC $2.00/MF $0.50

High Velocity Lab., Univ. of Utah, Salt Lake City.
PENETRATION AND CRATERING.
Quarterly progress rept. no. 1,
30 Sep 61, 35p
Contract AF04 647 952

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cratering, Guided missiles (Surface-to-surface)), (*Terminal ballistics, Guided missiles (Surface-to-surface)), Penetration, Projectiles, Projectile trajectories, Targets, Energy, Deformation, Electromagnetic waves, Acoustics, Recrystallization, Surfaces, Thermocouples, Scattering, Metals, Materials, Elasticity, Stresses, Equations, Mathematical models.

The goals of this work are to discover what is happening in high-velocity impact, to attempt to understand these phenomena in terms of fundamental material properties and the fundamental laws of the mechanics of deformable bodies, and to use this information to formulate general theory which will adequately describe the physical processes occurring and which can be extrapolated to new situations with confidence. The plan to achieve these goals is to construct simplified mathematical and graphical models of the transient cratering process and then to test predictions made on the basis of the chosen model with the results of experiments. The experiments will determine the validity of the model under particular circumstances and will point the way to possible improvements in the model. The most fundamental questions of how the energy is divided among various competing processes and what the actual flow is have never been investigated. To correct this situation and provide basic information on the physical processes occurring in cratering, three general projects were instituted. They are: (1) an investigation of the energy distribution in cratering, (2) an investigation of flow and wave motion in cratering, and (3) an investigation of wave propagation in a rod.

AD-608 949 Div. 12
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana. Engineering Experiment Station.
A STUDY OF SPECIAL INTERPLANETARY FLIGHT PROBLEMS.
Rept. no. 1,
by M. Z. v.Krzywoblocki, Tzu-Sien Shao, and Robert Farquhar. 4 Mar 59, 56p
Contract DA11 022ORD2835

Unclassified report

Descriptors: (*Interplanetary trajectories, Space flight), (*Space flight, Interplanetary trajectories), Orbital trajectories, Circular orbit trajectories, Elliptical orbit trajectories, Space navigation, Astronautics, Satellites (Artificial), Rockets, Earth, Mars, Spacecraft, Abstracting.

The report contains a review of some more interesting papers and articles published in the past on the subject of the orbit mechanics and interplanetary trajectories in the solar system. The review is performed with a special goal in mind, namely to select the papers which are best suited to present interplanetary trajectories between the Earth and Mars.

AD-608 968 Div. 12
OTS Prices: HC $3.00/MF $0.50

Applied Physics Lab., JHU, Silver Spring, Md.
GRAVITY-GRADIENT ATTITUDE STABILIZATION FOR COMMUNICATION SATELLITES,
by Frederick F. Mobley. Sep 64, 51p TG-597
Contract NOw62 0604c

Unclassified report

Descriptors: (*Attitude control systems, Satellites (Artificial)), (*Gravity, Stabilization systems), (*Satellites (Artificial), Stabilization systems), Communication satellites (Active), Communication satellites (Passive), Flight control systems, Celestial mechanics, Aeronautics, Stabilized platforms, Inertial guidance.

Gravity-gradient attitude stabilization has been used successfully in a number of near-earth satellites in recent months. After the pioneering effort of the Applied Physics Laboratory in the first successful demonstration of gravity stabilization in June 1963, this technique has become one of the basic elements of satellite technology. By January of 1964 three APL satellites had been vertically stabilized by the passive gravity-gradient technique, and are expected to continue in this state indefinitely. A satellite of the Naval Research Laboratory was also stabilized successfully in January 1964. These developments are reviewed herein, and the problems of extending these techniques to higher altitude for use as communication satellites are discussed. (Author)

AD-609 020 Div. 12
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
A METHOD OF DAMPING MISSILE STRUCTURAL BENDING MODES FOR AUTOPILOT DESIGN,
by Lawrence E. Freed and Kenneth L. Miller.
18 May 59, 42p STL-TR-59-0000-00677

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Guided missiles, Damping), (*Automatic pilots, Design), Structural properties, Thrust vector control systems, Feedback, Oscillation, Deformation.

The method presented introduces a reasonable amount of linear damping into the structural modes of oscillation by means of an auxiliary feedback loop. It is that this auxiliary loop can generally be made stable and that the damping in the structural modes can generally be increased. The scheme does not depend critically on the bending resonance frequencies nor on the mode shape amplitude, slope, or node location.

AD-609 041 Div. 12, 30
OTS Prices: HC $3.00/MF $0.75

Wolf Research and Development Corp., West Concord, Mass.
CALIBRATION SATELLITE STUDIES.
Final rept.,
by M. Richard Harris, Gerald A. Quellette, Harry R. Kahler, and John F. Pasieka. 22 Oct 64, 59p
WRDC-64-3897-6
Contract AF19 628 3897, Proj. 5930, Task 5930 03
AFCRL 64 873

Unclassified report

Descriptors: (*Satellites (Artificial), Calibration), (*Guided missile tracking systems, Calibration), Ground

support equipment, Telemeter systems, Tracking, Guided missile ranges, Instrumentation, Systems engineering, Mathematical analysis.

Described are results of the mathematical and systems engineering investigations that were performed on calibration of range instrumentation by means of a calibration satellite. These studies are based on the premise that the instrumentation systems to be calibrated using such a satellite are the MISTRAM and GLOTRAC CW systems and the C-Band and S-Band pulse radar systems. It was further defined, based on present Air Force program planning, that the basic vehicle to carry the calibration payload would be the SATAR (Satellite for Aerospace Research) sponsored by the Office of Aerospace Research. The capabilities of SATAR do not allow the simultaneous inclusion of transponders compatible with all the above systems on one vehicle. These studies have preserved flexibility in techniques within these constraints. (Author)

AD-609 139 Div. 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RENDEZVOUS IN THE ORBIT,
by L. Gil'berg. 9 Nov 64, 18p
FTD TT64 1169; TT 65 60434

Unclassified report

Unedited rough draft trans. of Znanie-Sila (USSR) 1964, v. 39, no. 4, p. 38-41.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rendezvous spacecraft, Space flight), (*Satellites (Artificial), Moon), Rendezvous trajectories, Orbital trajectories, Lunar trajectories, USSR.

The possibility and feasibility of cosmic rendezvous in the vicinity of the Moon is discussed.

AD-609 169 Div. 12, 1, 14, 17
OTS Prices: HC $3.00/MF $0.75

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
UTILIZATION OF REFRACTORY ETALS ON THE X-20A (DYNA-SOAR).
Rept. for May 60-10 Dec 63,
by William Cowie. Jun 64, 53p
SEG TDR64 19

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Boost-glide vehicles, Refractory metal alloys), (*Refractory metal alloys, Aerospace craft), (*Heat shields, Refractory metal alloys), (*Reentry vehicles, Refractory coatings), Ceramic materials, Airfoils, Silicides, Molybdenum alloys, Titanium alloys, Zirconium alloys, Niobium alloys, Refractory metals, Thermal insulation, Panels (Structural), Ablation, Plasma jets, Test facilities.

The utilization of coated refractory metals as heat shields and leading edges on the X-20 is discussed. Peculiarities and history of the materials used, designs, developmental tests, and problems are emphasized in this resume. Molybdenum alloys Mo-.5Ti and Mo-.5Ti-.07Zr, columbium alloy D-36, and silicide coatings are discussed in relation to their applicability and effectiveness in an X-20 re-entry environment. The practicality of a heat-protection system capable of resisting 3000F for long periods of time is demonstrated. (Author)

AD-609 174 Div. 12, 7, 27
OTS Prices: HC $2.00/MF $0.50

Air Force Aero Propulsion Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
RESEARCH AND DEVELOPMENT OF A FRICTION-CONTROLLED FACE SEAL.
Progress rept.,
by Robert J. Smith. Sep 64, 30p
Proj. 8128, Task 812807
APL TDR64 108

Unclassified report

Descriptors: (*Seals (Stoppers), Spacecraft), (*Power equipment parts, Spacecraft), (*Space propulsion, Seals (Stoppers), Friction, Vacuum seals, Shafts, Thermal properties, Rotary seals, Lubrication, Design, Tests.

This investigation was undertaken to develop a dynamic seal for space power equipment. The concept investigated was a face seal designed so its axial load automatically varied to maintain light sliding contact on the seal faces even with large changes in the power system conditions. Preliminary testing was done on a seal sized for a 1-inch diameter shaft, sealing 20 psia nitrogen from air at room temperature, and operating at rotational speeds from 3000 to 12,000 rpm. The testing has demonstrated a 20 to 1 reduction in seal friction over that attainable with conventional designs. This should correspond to a minimum increase in life of 20 times. This reduction in friction was achieved in spite of the absence of seal liquid lubrication. (Author)

AD-609 227 Div. 12, 14
OTS Prices: HC $3.00/MF $0.75

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
RECOMMENDED STUDIES OF VIBRATORY ENERGY DISSIPATION AND CONDUCTION IN AEROSPACE STRUCTURES.
Rept. for Dec 62-Apr 64,
by E. E. Ungar. Oct 64, 54p BBN-1145
Contract AF33 657 10125, Proj. 1370, Task 137005
FDL TDR64 111

Unclassified report

Descriptors: (*Aerospace craft, Vibration), (*Damping, Aerospace craft), (*Heat-resistant materials, Aerospace craft), Energy, Inflatable structures, High-temperature research, Filament wound construction, Sandwich construction, Laminates, Thermal properties, Heat-resistant metals and alloys, Couplings, Equations.

Advanced aerospace structural concepts are described and reviewed with respect to the need for further information on their energy dissipation properties. The status of the recently developed statistical energy method for vibration analysis is described, and areas where additional studies are required are pointed out. A unified review of some derivations basic to the statistical energy method is appended, as is an application of it to problems associated with measuring loss factors of nonisolated systems. (Author)

AD-609 236 Div. 12, 8
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge Inc., Los Angeles, Calif.
RADIO FREQUENCY PROPAGATION TO AND FROM ICBM'S AND IRBM'S,
by William Harry Drake and Fred Stanley Howell.
1959, 21p GM-36.4-245

Unclassified report

Legibility of this document is in part unsatisfactory.

Reproduction has been made from best available copy.

Descriptors: (*Blackout (Electromagnetic), Guided missile tracking systems), (*Radiofrequency interference, Guided missiles (Surface-to-surface)), (*Guided missiles (Surface-to-surface), Radiofrequency interference), Transmissions, Attenuation, Antenna radiation patterns, Plasma sheath, Shock waves, Rocket motors, Flames, Telemeter systems, Radar tracking, Guidance.

An analysis has been made of a large number of ICBM and IRBM instrumented launches to determine the causes of data 'drop outs'. Results of the analysis show effects produced by flame, antenna ionization, antenna pattern and pressure shock wave. Recommendations are included which will assist systems engineers to reduce the detrimental aspects of the effects encountered. These effects are applicable to all systems of all frequencies. Data includes radar, Azusa, telemetry and other equipment operating on frequencies from 200 megacycles to X-band. (Author)

AD-609 256 Div. 12, 30
OTS Prices: HC $1.00/MF $0.50

Philco Research Labs., Newport Beach, Calif.
STABILITY CHARACTERISTICS OF THE HYPER-ENVIRONMENTAL TEST SYSTEM 609A DATA RECOVERY VEHICLE AT M = 2.87.
Technical operating rept.
10 Feb 60, 24p U-816
Contract AF04 647 449

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Recovery vehicles, Aerodynamic configurations), Supersonic wind tunnels, Test models, Stability, Blunt bodies, Environmental tests, Angle of attack, Time, Weight, Models (Simulations).

The report presents the results of a series of tests in the supersonic wind tunnel at the University of California at Los Angeles to evaluate the stability of the data recovery vehicle being developed for the Hyper-environment Test System 609A. The tests, which were conducted at M = 2.87 confirmed that the vehicle with the blunt base was stable at alpha = 180 degrees. This stability was eliminated by the addition of a cruciform fin configuration to the aft surface of the reentry body. (Author)

AD-609 267 Div. 12, 8
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
THE MECHANICAL IMPEDANCE CONCEPT IN VIBRATION DESIGN OF MISSILE ELECTRONIC EQUIPMENT,
by William A. Mullee. 3 Aug 60, 24p
STL/TN-60-0000-09138

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronic equipment, Guided missiles (Surface-to-surface)), (*Guided missile components, Structural properties), (*Vibration, Electronic equipment), Ground support equipment, Electrical impedance, Acoustic impedance, Airborne, Measurement, Loading (Mechanics), Shock waves, Mechanical waves, Military requirements, Design.

A realistic description of the vibration environment seen by missile and satellite electronic equipment can be obtained by performing structural impedance measurements. Present engineering methods assume that the electronic packages are mounted on an infinite impedance source. This approach, however, often leads to misinterpretation of telemetry data and unrealistic testing by environmental specifications. Recommendation for the development of a structural impedance measuring system which can be employed on lightweight missile structures is made on the basis of a state-of-the-art survey of present day equipment and measurement methods. The significance of mechanical impedance measurements is presented with respect to development of realistic environmental specifications and the design and qualification of missile electronic equipment and equipment support structure. (Author)

AD-609 275 Div. 12, 2
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
MISSILE DESIGN FOR THE EFFECTS OF WINDS ALOFT,
by D. C. Bakeman. 13 Sep 62, 45p
TDR-69(2116)TN-1
Contract AF04 695 69
DCAS TDR62 190

Unclassified report

Descriptors: (*Launching, Optimization), (*Guided missiles trajectories, Wind), (*Wind, Guided missiles trajectories), (*Checkout procedures, Launching), Upper atmosphere, Meteorology, Weather forecasting, Statistical processes, Launch vehicles (Aerospace), Failure (Mechanics), Probability, Shear stresses, Buffeting, Costs.

A major problem in the design of large booster missiles is the proper consideration of the effects from winds aloft. Since wind magnitude and direction are statistical in nature, the problem can only be solved by the use of statistical techniques. This report suggests that the design requirement be a given probability of failure or launch delay due to winds aloft, or an optimization between cost (in terms of weight, schedules, etc.) and the probability of failure or launch delay. A methodology is then presented, along with pertinent background information and discussion, for designing to any of those requirements. Also presented is a procedure for a prelaunch wind check in which wind effects magnitudes are predicted for a flight. (Author)

AD-609 278 Div. 12, 25
OTS Prices: HC $2.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
TEMPERATURES AND ABLATION RATES IN AN ABLATING HEAT SHIELD EXPOSED TO A TRIANGULAR HEAT INPUT,
by J. V. Beck. 4 Dec 59, 47p RAD-9 (7)-TM-59-74
Contracts AF04 647 305, AF04 647 258,
Projs. WS107A2, WS133A

Unclassified report

Descriptors: (*Ablation, Heat shields), (*Reentry vehicles, Aerodynamic heating), (*Aerodynamic heating, Shielding), Ablation, Heat transfer, Design, Thermal conductivity, Numerical methods and procedures, Surface temperatures, Thermal insulation.

A powerful and new approximate analytical technique for solving non-linear heat conduction problems

employs the heat balance integral. This technique is applied herein to solve the ablation problem when a heat shield material is exposed to a triangular heat flux. The ablated material is considered to be mechanically removed immediately upon melting. Since the heating curve approximates re-entry conditions, the results of this investigation may be used to obtain insight into the actual thermal conditions in the heat shield during re-entry. The important dimensionless parameters are listed and curves are given to demonstrate the influence of each. Another use of this analysis is to provide an approximate check of digital solutions as well as an approximate method of designing re-entry shields for given heating conditions. (Author)

AD-609 301 Div. 12, 8, 30
OTS Prices: HC $1.00/MF $0.50

Univac Div., Sperry Rand Corp., St. Paul, Minn.
MBRV FEASIBILITY FLIGHT TEST PROGRAM.
Monthly progress rept. no. 9, 1-30 Nov 64,
1 Dec 64, 11p
Contract AF04 694 520 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Guided missiles, Computers), (*Reentry vehicles, Systems engineering), (*Digital computers, Guided missiles (Surface-to-surface)), (*Reliability (Electronics), Guided missiles components), Electronic equipment, Models (Simulations), Environmental tests, Acceleration, Vibration, Modules (Electronics), Containers, Design, Weight, Aluminum, Magnesium, Programming (Computers), Ground support equipment, Specifications, Simulation, Automatic pilots, Instruction manuals, Handbooks.

This is the ninth in the series of Progress Reports prepared by the Aerospace Systems Department of the UNIVAC Division of the Sperry Rand Corporation for the purpose of recording progress made on the MBRV Computer development program. The departments supporting the MBRV Program have reported their to-date progress.

AD-609 374 Div. 12
OTS Prices: HC $3.00/MF $0.75

Philco Corp., Palo Alto, Calif.
ATTITUDE DETERMINATION OF AN ORBITING SATELLITE. PART I. GRAVITATIONAL TORQUE. PART II. DYNAMICAL EQUATIONS FOR THE ATTITUDE MATRIX. PART III. MAGNETIC TORQUE.
Technical note,
by G. S. Goodman and G. Margulies. 15 Nov 62, 57p
WDL-TN62-7
Contract AF04 695 113 Unclassified report

Descriptors: (*Satellites(Artificial), Celestial mechanics), (*Celestial mechanics, Satellites (Artificial)), (*Astronautics, Celestial mechanics), Orbital trajectories, Position finding, Gravity, Magnetism, Torque, Mathematical analysis.

This Technical Note contains a study of the effect of the earth's gravitational field on the spin-motion of an orbiting satellite. Part I discusses gravitational torque, Part II dynamical equations for the attitude matrix, and Part II magnetic torque. Two appendices and a bibliography are included. (Author)

AD-609 382 Div. 12, 15
OTS Prices: HC $6.00/MF $1.25

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
TABLE FOR THE DETERMINATION OF THE MOTION OF SATELLITES ON ELLIPTIC TRAJECTORIES, PART 2.
Technical memo.,
by G. E. Lowitz. 15 Mar 60, 219p DSPO-TM-15, pt. 2
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Tables, Elliptical orbit trajectories), (*Elliptical orbit trajectories, Tables), Satellites (Artificial), Motion, Earth, Theory, Equations, Mathematical analysis.

This Technical Memorandum provides a table, by means of which the position of a satellite on its elliptical orbit, both in time and in space, can be quickly determined. The table yields directly to computation on spatial orbit. By adding the parameters of the motion of the earth, the relative motion of the satellite with respect to the earth is readily obtained. (Author)

AD-609 383 Div. 12, 15
OTS Prices: HC $6.00/MF $1.25

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
TABLE FOR THE DETERMINATION OF THE MOTION OF SATELLITES ON ELLIPTIC TRAJECTORIES, PART I.
Technical memo.,
by G. E. Lowitz. 15 Mar 630, 215p DSPO-TM-15, pt. 1
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Tables, Elliptical orbit trajectories), (*Elliptical orbit trajectories, Tables), Satellites (Artificial), Motion, Earth, Theory, Equations, Mathematical analysis.

This Technical Memorandum provides a table, by means of which the position of a satellite on its elliptical orbit, both in time and in space, can be quickly determined. The table yields directly to computation on spatial orbit. By adding the parameters of the motion of the earth, the relative motion of the satellite with respect to the earth is readily obtained. (Author)

AD-609 389 Div. 12, 2
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
LUNAR-SOLAR PERTURBATIONS OF THE ORBIT OF AN EARTH SATELLITE,
by Mildred M. Moe. 29 Sep 59, 13p
STL/TR-59-0000-00871
Unclassified report

Descriptors: (*Satellites (Artificial), Life expectancy), (*Orbital trajectories, Celestial mechanics), (*Celestial mechanics, Orbital trajectories), (*Perturbation theory, Orbital trajectories), Astronomical data, Moon, Sun, Motion, Numerical analysis, Errors.

An analysis of lunar-solar perturbations was made. It is assumed that the Kepler ellipse of the satellite is perturbed only by the sun and moon, ignoring, for the moment, the perturbations of the orbit by the earth's oblateness and atmosphere. It is also assumed that the angular velocities of the sun and moon are small enough compared to the angular velocity of the satellite to consider the sun and moon fixed during one revolution of the satellite. This simplifying assumption makes possible the integration of the instantaneous rate of change of the orbital elements over one revolution of the satellite to obtain the change in orbital elements per revolution. The magnitude of the error made by holding the disturbing body fixed is estimated. The results are applied to the orbit of Able-3 (1959 delta).

13. Installations and Construction

AD-608 943 Div. 13, 26, 32
OTS Prices: HC $1.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
THE DESIGN (CALCULATION) OF PRECIPITATING SEDIMENT IN IRRIGATIONAL BASINS,
by F. Sh. Mukhamedzhanov. Jun 64, 21p
BR-D Trans479; TT 65 60415

Unclassified report

O Raschete Osazhdeniya Nanosov v Irrigatsionnykh Otstoinikakh, trans. of Gidrotekhnika i Melioratsiya (USSR) 1963, v. 15, no. 9, p. 19-24.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sedimentation, Irrigation systems), (*Irrigation systems, Sedimentation), (*Hydraulic systems, Sedimentation), Fluid flow, Particles, Colloids, Separation, Structures, Hydrology, Engineering, USSR.

Existing methods of designing settling basins can be divided into two groups. (1) Methods accounting only the influence of turbulence of the flow on the length of the fall-out path of the particles. It is assumed that all sediment must fall out of the flow, even if in endless length. (2) Methods accounting the influence on the precipitating particles of the suspension capability of the flow. It is assumed that the flow can steadily retain in suspension a certain quantity of sediment, called the critical turbidity. The calculations of the first group is simpler (the methods of D. Sokolov, E. Zamarin, M. Velikanov, A. Zegda and others), and is implemented in the design of basins for hydro-stations, where relatively large (d > 0.25 MM.) sediment having a hydraulic size much larger than the suspension capability of the flow in the basin. (Author)

AD-608 948 Div. 13
OTS Prices: HC $2.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
THE INFLUENCE OF MONOMOLECULAR FILMS ON EVAPORATION FROM WATER SURFACES,
by V. S. Makarova and V. I. Kuznetsov. Nov 63, 26p
BR-D Trans460; TT 65 60416

Unclassified report

O Vliyanii Monololekulyarnykh Plenok na Isparenie s Vodnoi Poverkhnosti, trans. of Gosudarstvennyi Gidrologicheskii Institut. Trudy (USSR) 1961, v. 91, p. 5-13.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Monomolecular films, Water supplies), (*Water supplies, Evaporation), (*Alcohols, Monomolecular films), Dams, Surfaces, Evaporators, Oils, Measurement, USSR.

The method and results of field investigations in 1960 on the use of monomolecular films of various types of fatty alcohols as a medium for protecting water surfaces from evaporation are discussed in the article. (Author)

AD-608 957 Div. 13, 12, 30
OTS Prices: HC $7.40/MF $2.25

Texas Instruments, Inc., Dallas.
TECHNIQUES FOR LUNAR WATER EXPLORATION.
Final rept. for 1 Jul 63-30 Sep 64,
by James K. Westhusing and Christopher Crowe.
30 Sep 64, 438p
Contract AF19 628 3287, Proj. 0000
AFCRL 64 814

Unclassified report

Descriptors: (*Moon, Water supplies), (*Water supplies, Moon), Lunar probes, Rock (Geology), Chemical properties, Physical properties, Exploration, Lunar environment, Geophysics, Geology, Models (Simulations), Surface properties, Permafrost, Hydrates, Test methods.

At least twenty geophysical and geological techniques have potential application in orbital and surface exploration programs for locating and evaluating possible water-bearing deposits on the moon. Evaluation of technique applicability requires the formulation of models of the lunar subsurface and specification of lunar rock types and their possible mineralogic, chemical and physical properties. Eight subsurface models and nine rock types are postulated. Lunar rock properties are estimated by evaluation of terrestrial rock measurements and possible modifications produced by lunar genesis and environment. Optimum combinations of surface and orbital methods are selected by comparing calculated or estimated survey responses across the models. Practical difficulties such as weight, power and volume restrictions, implanting of electrodes, and drilling are also considered. In practice, data obtained by combinations of methods should be interpreted simultaneously to assure definition of a geologic or structural explanation applicable to all data. The methods recommended for orbital reconnaisance and surveying are photo-television, infrared, radar altimetry and magnetic. Those recommended for surface exploration are gamma ray, television, infrared, gravity, magnetic and electromagnetic. Comprehensive data concerning all equipment types considered are presented. (Author)

AD-609 018 Div. 13
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE EXPERIENCE FOR FISCAL YEAR 1963,
Nov 64, 48p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fire safety, United States government), (*Fires, Costs), Federal budgets, Forest fires, Ship fires, Aerospace craft, Buildings, Wounds and injuries, Fire pumps, Management planning, Statistical data, Reports.

The annual report of fire loss experience in 1963 is presented by the Federal Fire Council in order to serve the Federal community. The composite Federal fire loss experience is considered to be of value to each agency for planning and learning. It is wasteful for agencies to insist on personal experience as the sole criterion for planning a fire safety program. Learning based on individual agency experience is the most effective--but, the cost can be high in dollars and lives. Each agency is encouraged to use this report as a springboard for self-evaluation. The Council will use it to plan future fire loss management programs.

AD-609 109 Div. 13, 15
OTS Prices: HC $1.00/MF $0.50

Princeton Univ., N. J. School of Engineering and

Applied Science.
AN ENGINEERING APPLICATION OF FOUR-DIMENSIONAL DESCRIPTIVE GEOMETRY.
Technical Seminar Series,
by C. Ernesto S. Lindgren. 12 Nov 64, 10p PU-TSS-12
Unclassified report

Rept. on Engineering Graphics Seminar.

Descriptors: (*Structural engineering, Projective geometry), (*Projective geometry, Structural engineering), Structures, Mechanical engineering, Mathematical analysis, Curve fitting.

This paper presents an application of the theory of the four-dimensional descriptive geometry. It deals with the development of a technique for plotting curves whose points are related to four parameters. Two charts are presented: Chart I shows the usual two-axis-type of plotting relating more than two parameters; Chart II shows the results of the application of the theory mentioned above. (Author)

AD-609 130 Div. 13
OTS Prices: HC $2.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
CANAL DISCHARGE MEASUREMENTS WITH RADIOISOTOPES,
by J. C. Schuster. 22 Oct 64, 43p Hyd-527
Unclassified report

Descriptors: (*Inland waterways, Fluid flow), (*Fluid flow, Radioactive isotopes), Measurement, Radiation measurement systems, Labeled substances, Gold, Geiger counters, Test methods, Diffusion, Turbulence, Shear stresses, Counting methods, Velocity, Arizona.

Half-capacity tests in Feb 1962 and full-capacity tests in June 1963 using Gold- 198 were made in a straight section of a concrete-lined irrigation canal with a design discharge of 620 cfs. The pulse or total-count radioisotope method was used for 65 discharge measurements. Consistency of the radioisotope method was evaluated by using up to 4 portable Geiger counting systems. Conclusions were: / (1) With adequate mixing of radioisotope and canal water; accuracy of 97% or greater is possible when compared with current meter discharge measurements. (2) In a canal with hydraulic characteristics similar to the one tested, a 2,500- to 3,000-ft mixing length is needed for 98 to 99% mixing. (3) Minimum mixing length may be computed for similar straight canals using a diffusion coefficient and time factor developed from these tests. (4) Simultaneous multiple injections of tracer will provide higher probability of uniform mixing in shorter lengths than will single injections and also result in higher diffusion coefficients. (5) With sufficient data from canals of various sizes mixing length equations can probably be derived for canals having a minimum of turbulence.

AD-609 131 Div. 13, 2
OTS Prices: HC $3.00/MF $0.75

Bureau of Reclamation, Denver, Colo.
FIELD JACKING TESTS OF FOUNDATION ROCK MORROW POINT DAMSITE - CURECANTI UNIT, COLORADO RIVER STORAGE PROJECT,
by F. Anderson. 9 Nov 64, 89p C-1128
Unclassified report

Descriptors: (*Dams, Foundations (Structures)), (*Foundations (Structures), Tests), (*Rock (Geology), Foundations (Structures)), Jacks (Mechanics), Hydraulic jacks, Underground structures, Metamorphic rock, Extense meters, Colorado.

Field jacking tests were conducted at Morrow Point Dam to determine the in-situ characteristic of the foundation rock beneath the Bureau's first double curvature thin arch dam. The basic test procedures consisted of applying loads of known intensity to the rock inside tunnels driven in both abutments and measuring the resulting rock deformation. Load is applied to the rock by two jacks, 3 feet apart, each having a capacity of 200 tons. Loads were applied first vertically and then horizontally at the same tunnel location during a test series. Loads of 200, 400, and 600 psi were applied to the rock each for a period of approximately 1 week utilizing automatic controls to maintain the load. The data, when properly analyzed and carefully correlated with the results of laboratory core sample investigations and field seismic studies, should provide the basis for a reliable prediction of foundation deformations under the dam structure. The influence of joints and fissures were apparent in these tests, indicating the importance of performing site tests in every instance where a major structure is planned on a rock foundation.

AD-609 166 Div. 13
OTS Prices: HC $1.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
HYDRAULIC DOWNPULL COMPUTATIONS FOR GLENDO DAM FIXED-WHEEL GATE, MISSOURI RIVER BASIN PROJECT, WYOMING.
Laboratory rept.,
by D. Colgate. 3 Apr 64, 14p Hyd-524
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dams, Hydraulic valves), (*Gate valves, Hydrodynamics), Force (Mechanics), Water supplies, Volume, Pressure, Hydraulic systems, Mathematical analysis.

The hydraulic downpull forces that will be caused by 2-minute closures of the 16.5- by 21.0 foot Glendo Dam outlet works fixed-wheel gate were computed. Previous model studies (Hydraulics Laboratory Report No. Hyd-421, February 8, 1957) evaluated the hydraulic downpull for a stable condition of flow with the gate stationary at various openings. The present computation showed the added downpull caused by water trapped in the shaft above the gate during rapid closures to be about 4,500 pounds for gate openings larger than 3 feet. No additional downpull occurred at openings smaller than 3 feet. The maximum downpull of 40,000 pounds that occurs at 0.25 foot gate opening remains the maximum and unchanged. (Author)

AD-609 197 Div. 13
OTS Prices: HC $4.00/MF $0.75

Bureau of Reclamation, Denver, Colo.
STUDIES AND PROCEDURES FOR THE CONTROL OF CRACKING IN MASS CONCRETE STRUCTURES,
by Charles L. Townsend. Nov 64, 109p
BR-D TM664
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Concrete, Fracture (Mechanics)), (*Tensile properties, Concrete), (*Dams, Structural properties), Strength, Loading (Mechanics), Thermal properties, Construction, Temperature control, Cooling, Pipes, Thermal stresses, Contraction, Solar radiation, Costs, Cements.

Cracking occurs in mass concrete when tensile stresses exceed the tensile strength of the concrete. Most of these stresses are caused by restraint against volume change; others occur because of loading conditions and the configuration of the structure. To estimate future tensile stresses, temperature studies must be made to determine the temperature changes which will occur in a structure from the time concrete is first placed in the structure until the structure is in normal operation. These temperature changes are made a part of the design and construction of the structure. The range or amplitude of mean concrete temperature in a mass concrete structure is of primary interest, but temperature gradients are also investigated. The heat of hydration of the cement, the concrete mix proportions, the diffusivity of the concrete, amplitudes of air and reservoir temperatures, and solar radiation affect the concrete temperatures. Knowing the concrete temperatures and temperature changes to be encountered, the width and length of the construction block is determined, the precooling and/or artificial cooling measures are selected, and construction requirements are determined. Included in the latter are surface treatments, operation of cooling systems, height differentials, and foundation irregularities. (Author)

AD-609 270 Div. 13, 2, 9
OTS Prices: HC $4.00/MF $1.00

Hydrodynamics Lab., Mass. Inst. of Tech., Cambridge.
BREAKWATER CHARACTERISTICS OF OPEN-TUBE SYSTEMS.
Rept. no. 73,
by A. T. Ippen and E. L. Bourodimos.
Jul 64, 122p MIT-DE-R64-33
Contract Nonr184159, Proj. 8228
Unclassified report

Descriptors: (*Breakwaters, Performance (Engineering)), Water waves, Hydrodynamics, Energy, Kinetic theory, Pipes, Structural parts, Power, Reduction, Scattering, Turbulence, Distribution, Force (Mechanics), Design, Harbors, Tables, Statistical data.

The characteristics of a breakwater of a new type are presented. This new breakwater acts as a scattering or 'de-tuning' device for the periodically transmitted wave energy. In its ideal form it would produce a completely random output of the wave energy and dissipation through turbulence. The present versions of this breakwater consist of different arrays of open tubes aligned with the direction of wave motion and occupying approximately 30-40 percent of any partial section or of the total section through which the waves pass. Conventional breakwaters protect essentially by reflection of wave energy or by dissipation through breaking of the waves. By contrast, the breakwater type under investigation dissipates a major portion of the energy by currents induced in the tubes and generating turbulence at the tube exits, by surface resistance, and by interference with energy transmission through the array of tubes. Reflection is of minor importance. This study reports on the energy dissipation, reflection and transmission achieved with various combinations of wave characteristics and arrangements of open tubes as well as on the forces exerted by wave action on the breakwater. (Author)

AD-609 283 Div. 13, 30
OTS Prices: HC $3.00/MF $0.75

Southwest Research Inst., San Antonio, Tex.
THE DEVELOPMENT OF MODELS FOR USE IN THE INVESTIGATION OF FIRE SPREAD.
Final rept. for 1 Jul 63-1 Oct 64,
by Lester A. Eggleston, John E. Ambrose, William W. Bradshaw, and Calvin H. Yuill. 2 Nov 64, 70p
SwRI-03-1212
Contract DA49 146XZ146, Task NWER12 024
DASA 1561
Unclassified report

Descriptors: (*Fires, Buildings), (*Buildings, Fires), (*Test models, Flammability), Fire safety, Combustion, Models (Simulations), Design, Roofs, Wood, Fuels, Construction, Control systems, Wind, Terrain, Burning rate.

The considerations involved in the development of models of buildings for use in the study of mass fires and fire spread are examined. It is demonstrated (1) that scaling laws apply to actual models of structures as well as to wood cribs and (2) that the effect of wall and roof openings, interior walls, fuel thickness and weight on burning rates can be established. A 3/8-in. by 1-1/4-in. electronic model has been developed with control circuitry that can be used repeatedly in multiple units to determine the effect of building construction and size, spacing between buildings, terrain, wind and burning intensity on fire spread in specific situations. (Author)

AD-609 341 Div. 13, 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
METHODS OF CONTROLLING AND EXTINGUISHING TITANIUM FIRES.
Technical note,
by D. J. Maykuth. Jul 64, 5p
Unclassified report

Descriptors: (*Titanium, Fires), (*Fires, Titanium), (*Fire safety, Titanium), Fire extinguishers, Oxides, Metals, Powder metals, Combustion, Burning rate, Graphite, Sand, Water, Helium group gases, Storage, Flammability.

The purpose of this note is simply to summarize the methods and materials which have been developed to date for the control and extinguishment of fires involving titanium metal. The problems of controling and extinguishing titanium fires are greatly compounded by the extremely high affinity of titanium for oxygen and nitrogen, and the fact that the oxides of titanium are readily soluble in the molten metal. Thus, heated titanium can readily reduce many of the compounds or liquids normally used as extinguishing agents, and the absence of a protective oxide film results in the presence of a continuously reactive surface on the molten metal.

AD-609 371 Div. 13
OTS Prices: HC $2.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
EVALUATION OF CONCRETE LINING, CLEAR CREEK POWER TUNNEL,
by G. G. Hoagland. 12 Oct 64, 46p C-1125
Unclassified report

Descriptors: (*Underground structures, Concrete), (*Concrete, Underground structures), Aging (Materials), Compressive properties, Bonding, Tests, Elasticity, Fracture (Mechanics), Performance (Engineering), Test methods, Water.

Tests on the lining of Clear Creek Power Conduit, CVP, indicate good quality concrete used in both sections of the tunnel, normal strength development with increase in age, and good concrete control and placement for a type of

construction probably beset by more placing problems than are normally encountered in concrete structures. Six-in.-dia concrete cores were extracted at 31 locations to establish the relationship between the properties of the in-place concrete and the 28-day control cylinders, evaluate tunnel lining placing efficiency, and establish penetration of backfill pressure grouting. Test results are given.

AD-609 372 Div. 13
OTS Prices: HC $1.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
FIXED-WHEEL GATE BEARING STUDIES.
Progress rept.,
by G. I. Brooks, M. Lopez, Jr., and D. B. Mountjoy.
1 Oct 64, 9p MECH-1

Unclassified report

Descriptors: (*Dams, Gate valves), (*Gate values, Bearings), (*Bearings, Friction), Antifriction bearings, Roller bearings, Loading (Mechanics), Bronze, Stainless steel, Corrosion, Lubrication, Design, Tests, Underwater equipment, Performance (Engineering).

Tests to determine friction coefficients and bearing behavior in 3 types of bearings--2 self-lubricating and 1 plain bronze--show that increased allowable bearing pressures of 6,000 psi and a design coefficient of friction of 0.10 can be used for one of the self-lubricating-type wheel bearings (Type B). Antifriction roller bearings were studied because reductions in wheel-bearing friction forces gained from raising allowable bearing pressure may not always be sufficient to permit gravity closure. Although antifriction bearings cost more, there are circumstances in which the higher bearing cost could be offset by other overall design or economic considerations. Since bearings must support heavy radial loads as well as thrust loads, only tapered roller and self-alining spherical roller bearings were studied. Self-alining spherical roller bearings were chosen because the self-alining feature compensates for deflections caused by hydraulic load and for installation and fabrication mis-alinements. Fixed-wheel gate design on one job using antifriction self-alining spherical roller bearings saved 12,000 pounds of gate weight and 23,000 pounds in hoist capacity. Operation and maintenance experience from this gate will help evaluate reliability of these bearings. (Author)

14. Materials (Non-Metallic)

AD-608 924 Div. 14
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana.
AN INVESTIGATION OF THE MECHANICS OF FAILURE IN GLASS FIBER REINFORCED PLASTICS.
Final summary rept.,
by H. T. Corten. Sep 64, 5p
Contract Nonr294702X

Unclassified report

Descriptors: (*Composite materials, Filament wound construction), (*Plastics, Glass textiles), Reinforcing materials, Fracture (Mechanics), Filaments, Glass, Surface properties, Epoxy plastics, Toughness, Moisture, Tensile properties.

The observed strengths of filament wound fiberglass composites are considerably below the potential strength anticipated for an ideal filament-resin composite structure. Design difficulties occasioned by the lack of ideal geometric configurations for filament winding, as well as fabrication defects and unintentional surface flaws each may contribute to a reduction from the strength of an ideal structure. The purpose of this investigation was to understand the behavior of glass fiber-resin composite materials, and particularly the mechanics of fracture. Observations and inspection of failures of composite structures indicates that fracture is progressive. Cracks are initiating in very localized regions and propagated into surrounding material. Thus the strength of a few weakest regions controls the strength of the structure, rather than the average strength of the material. Elimination of fabrication defects which initiate cracks in the composite material promises large rewards in terms of more nearly realizing the potential strength of the composite material. (Author)

AD-608 939 Div. 14, 2, 30
OTS Prices: HC $1.25/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
DEEP-OCEAN BIODETERIORATION OF MATERIALS. PART 1. FOUR MONTHS AT 5,640 FEET.
Technical rept.,
by James S. Muraoka. 2 Nov 64, 39p
Proj. Y R011 01 01 042
NCEL R329

Unclassified report

Descriptors: (*Materials, Fungus deterioration), (*Marine biology, Fouling), Ocean bottom sampling, Sea water, Oceanographic data, Marine borers, Microorganisms, Bacteria, Growth, Marine geology, Fibers (Natural), Cordage, Metals, Plastics, Rubber, Glass, Laminates, Wood, Sediment, Test methods, Pacific Ocean.

This is Part I of a series of reports on the biodeterioration of materials in the deep ocean. It covers the data obtained by sampling mud, sea water, and rocks, and data obtained by exposing 1,324 specimens of 492 materials for 4 months on the Pacific Ocean floor at a depth of 5,640 feet. The materials were attached to a Submersible Test Unit (STU). The STU was retrieved in February, 1964, and returned to the Laboratory for tests and analyses. There were no marine fouling organisms attached to the metal test specimens. Some of the plastic materials were covered with a bacterial slime growth. Cotton rope, Manila hemp rope, and burlap wrappings were deteriorated by microbial activity. Pine test panels and Manila hemp rope were attacked by marine boring organisms (Xylophaga washingtona Bartsch). Various species of fouling organisms were found on rock samples collected from the ocean floor in the vicinity of the STU test site. Also presented are equipment and methods for obtaining samples and data on oceanographic cruises as well as those used with the STU. (Author)

AD-609 001 Div. 14, 27
OTS Prices: HC $0.75/MF $0.50

Rock Island Arsenal, Ill.
ELASTOMERIC INSULATION FOR SOLID PROPELLANT ROCKET MOTORS.
by D. H. Sale. 27 Oct 64, 23p
Proj. 1C0 24401A110
RIA 64 3158

Unclassified report

Descriptors: (*Thermal insulation, Elastomers), (*Rocket motors (Solid propellant), Thermal insulation), (*Vulcanizates, Thermal insulation), Asbestos, Acrylonitrile polymers, Phenolic plastics, Aldehydes, Heat-resistant plastics, Surface-active substances, Physical properties, Tests, Torches, Synthesis.

The development of flexible, elastomeric-based, solid propellant rocket motor case insulation is discussed. The effect on insulation properties of type of asbestos, of liquid versus solid elastomers, and of methods of dispersing fibrous compounding ingredients are reported. Oxyacetylene torch and static motor firing test data for some of the better insulation materials developed, as well as for some commercial materials, are presented. A material with 40 percent elongation, 1.34 gm/cc density, performance index of 95 sq cm sec/gm and erosion rate of 2.0 mils/sec was the most promising insulation developed. The material is a 55/45 butadiene/acrylonitrile compound containing phenol furfural resin, asbestos and oxyazoline wetting agent. It was satisfactorily bonded to aluminum and to steel by conventional bonding agent. The thermal properties of this vulcanizate are not affected by oven aging for one week at 70C. (Author)

AD-609 003 Div. 14
OTS Prices: HC $0.50/MF $0.50

Rock Island Arsenal Lab., Ill.
IMPROVEMENT OF HIGH TEMPERATURE PROPERTIES OF A FLUOROELASTOMER-PART II,
by E. W. Bergstrom. 13 Oct 64, 16p
Proj. 1C0 24401A110
RIA 64 3008

Unclassified report

See also AD 434 350.

Descriptors: (*Vulcanizates, Aging (Materials)), (*Heat-resistant plastics, Aging (Materials)), (*Halocarbon plastics, Aging (Materials)), Elastomers, Additives, Thermosetting plastics, Mechanical properties, Tensile properties, Amines, Aromatic compounds, Halogenated hydrocarbons, Fluorine compounds, Polymers, Calcium compounds, Oxides, Alkenes, Amino plastics, Phenolic plastics, Carbon, Graphite, Fibers, Heat treatment, Carbon black, Reinforcing materials, Organic nitrogen compounds.

This report covers results obtained in a study to improve the retention of physical properties of vinylidene fluoride/hexafluoropropylene (FPM) vulcanizates when measured at high temperatures. Several chemicals were evaluated as curatives for FPM, three being found effective. Calcium oxide was effective in eliminating the porosity associated with thick section post curing of

FPM. Several phenolic and melamine resins were evaluated for improving the properties of FPM when measured at high temperatures. None proved to be effective. The use of carbon and graphite fibers in FPM was found to afford improved high temperature strength. The heat treatment of FPM and carbon black in the presence of N-methyl-N, 4-dinitrosoaniline improved the high temperature properties of FPM. The use of high temperature press cures (400F. and above) did not improve the properties of FPM at high temperatures. (Author)

AD-609 107 Div. 14, 25
OTS Prices: HC $4.00/MF $1.00

New York State Coll. of Ceramics, Alfred Univ.
SEMICONDUCTING MATERIALS. PART I. SEMICONDUCTING AND ASSOCIATED PROPERTIES OF PROGRESSIVELY CRYSTALLIZED INFRARED TRANSMITTING GLASSES.
Final rept., pt. 1,
by Lyle H. Slack. Nov 64, 133p
Contract Nonr150301, Proj. NR015 215
Unclassified report

Doctoral thesis.
Legibility of this document is in part unsatisfactory.
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Descriptors: (*Semiconductors, Glass), (*Glass, Semiconductors), (*Composite materials, Thermoelectricity), Crystallization, Arsenic alloys, Selenium alloys, Tellurium alloys, Impurities, Porosity, Electrical conductance, Hall effect, Phase studies, Arsenic compounds, Oxides, Thermal conductivity, Microstructure, Chalcogens, Infrared optical materials, Density, Dielectric properties, X-ray diffraction analysis, Crystals.

Semiconducting glasses are a recently discovered class of materials which are attracting both theoretical and practical interest. The initial phase of this study consisted of an investigation of the thermoelectric properties of composites prepared by partially crystallizing the semiconducting glass As2SeTe2 where the crystalline phase which appeared is also As2SeTe2. The thermoelectric figure of merit was found to maximize as the degree of crystallinity was increased. Various anomalies are found when one attempts to study the mechanisms of conduction in the semiconducting glasses which might initially appear to violate band theory. These anomalies and peculiar behaviors are listed. It is evident that they may all be accounted for by the presence of an n-type high mobility phase disperse in a p-type low mobility phase. The infrared transmission data for the semiconducting glasses indicate the presence of crystalline As2O3. This suggests that this phase might also be responsible to some extent for the anomalous behaviors. (Author)

AD-609 116 Div. 14, 26
OTS Prices: HC $1.00/MF $0.50

United Aircraft Corp., East Hartford, Conn.
EXPLORATORY INVESTIGATION OF GLASS-METAL COMPOSITE FIBERS.
Bimonthly progress rept. no. 3, 14 Aug-13 Oct 64,
by J. E. Cox and R. D. Veltri. 10 Nov 64, 21p
C910242-3
Contract NOw64 0389f
Unclassified report

See also AD-609 117.

Descriptors: (*Composite materials, Fibers), (*Metals, Composite materials), (*Glass, Composite materials), Beryllium, Copper, Filaments, Drawing (Machine processing), Pipes, Melting, Protective treatments, Ceramic coatings, Zirconium compounds, Oxides, Aluminum compounds, Metal coatings, Boron compounds, Nitrides, Stainless steel, Manufacturing methods, Test methods, Tensile properties, Encapsulation, Fiber metallurgy, Ceramic materials.

This report is a summary of the investigations conducted during this bimonthly report period for the development of a process for producing continuous filaments of metal-glass composites. Several techniques were investigated as possible means of introducing molten beryllium into the forming zone of glass fibers being drawn from glass tubing. Protective coatings on beryllium wire and protection tubes inside the glass tube have been tried as means of limiting the reaction time between beryllium and glass. Only a few short lengths of beryllium-glass composite fibers were obtained. The reaction time has not been sufficiently reduced, but the general techniques warrant further consideration. Preliminary experiments have also been made on means of removing glass coatings from hand-drawn beryllium-glass composites. Molten sodium carbonate appears promising for chemically removing the glass. Work on copper-glass composites was limited to improvements in apparatus. Continuity testing equipment was improved and new winding equipment was installed to facilitate fiber removal, inspection and evaluation. (Author)

AD-609 117 Div. 14, 26
OTS Prices: HC $2.00/MF $0.50

United Aircraft Corp., East Hartford, Conn.
EXPLORATORY INVESTIGATION OF GLASS-METAL COMPOSITE FIBERS.
Bimonthly progress rept. no. 2, 14 Jun 13 Aug 64,
by J. E. Cox, R. D. Veltri, and C. E. Shulze.
11 Sep 64, 31p C910242-2
Contract NOw64 0389f
Unclassified report

See also AD-609 116.

Descriptors: (*Composite materials, Fibers), (*Metals, Composite materials), (*Glass, Composite materials), Filaments, Beryllium, Copper, Chromium, Encapsulation, Melting, Material forming, Manufacturing methods, Silicon compounds, Dioxides, Drawing (Machine processing), Fiber metallurgy.

This report is a summary of the investigations conducted during this report period for the development of a process for producing continuous filaments of metal encased in glass. Investigations of the melting characteristics of beryllium in various container materials have been made in an effort to develop a technique for introducing molten beryllium into a glass capillary as the glass is being pulled from tubing to fiber. Beryllium oxide, beryllium oxide-coated graphite, and boron nitride appeared to be satisfactory crucible materials for containing molten beryllium. Controlled flow of the metal from the crucible through an orifice has been complicated by the formation of a protective oxide coating which forms on the metal particles during heating. Research on a process for copper filaments has been chiefly concerned with an apparatus for determining the continuity of the copper core as the copper-glass composites are being drawn. Work on chromium-in-silica composite fibers was continued with a high-temperature resistance furnace. Additions to an existing cold-wall furnace permit producing silica fibers on a continuous basis. However, attempts to produce a chromium-silica composite have resulted in an unidentified reaction product. (Author)

AD-609 121 Div. 14
OTS Prices: HC $3.00/MF $0.75

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
SPECTROSCOPIC STUDIES OF THE VAPORIZATION OF REFRACTORY MATERIALS.
Final rept.,
by Milton J. Linevsky. 30 Nov 64, 61p
Contract AF33 615 1150, Proj. 4910, ARPA Order 24, Task 6

Unclassified report

Descriptors: (*Refractory materials, Vaporization), (*Spectroscopy, Refractory materials), (*Vaporization, Refractory materials), Magnesium compounds, Fluorides, Aluminum compounds, Oxygen compounds, Lithium compounds, Thorium compounds, Oxides, Zirconium compounds, Absorption spectrum, Infrared spectroscopy, Test methods, Molecular spectroscopy, Hafnium compounds, Borides, Titanium compounds, Nitrides, Atomic spectroscopy, Heat of formation, Vapor pressure, Boron.

The technique of matrix isolation has been used to obtain the infrared spectra of several high temperature molecules. A double boiler and reaction oven type Knudsen cell technique have been added to the general methods of matrix isolation resulting in greater versatility of the method. Differentiation between monomer and polymer spectra appears to be entirely possible. The following molecules have been studied: MgF2, AlF3, Li2F2, ThO2, ThO, ZrO2 and ZrO. In most cases tentative frequency assignments have been made and structural properties inferred. Atomic resonance line absorption studies have been carried out on HfB2, TiN and ZrN. Heats of formation have been obtained based on the observed vapor pressures. (Author)

AD-609 132 Div. 14, 17, 26
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
ELECTRODEPOSITED, ELECTROLESS, AND ANODIZED COATINGS ON BERYLLIUM,
by John G. Beach. 1 Sep 64, 14p DMIC-M-197
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Bibliographies, Coatings), (*Beryllium, Coatings), (*Coatings, Beryllium), Electrodisposition, Electroplating, Electrolytic polishing, Plating, Nickel, Platinum, Cleaning, Cladding, Zinc.

Because of expanding interest in the uses for beryllium, the Defense Metals Information Center has summarized information on surface finishing and coating of this metal. Its light weight and high modulus position beryllium as a favorable structural material for aerospace needs. The performance of beryllium is benefitted by preferred surface finishing and coatings. Available information is presented on electroless, electrodeposited and anodized coatings on beryllium. (Author)

AD-609 164 Div. 14, 29
OTS Prices: HC $1.00/MF $0.50

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
METHODS OF SANITIZING AND DEODORIZING RUBBERIZED FABRIC AND PRODUCING TEMPORARY ANTI-STATIC FILMS ON SYNTHETIC MATERIALS,
by W. E. MacKenzie. 2 Oct 64, 10p
NAEC-AML 2050

Unclassified report

Descriptors: (*Rubber coatings, Flight clothing), (*Cleaning compounds, Textiles), (*Textiles, Cleaning compounds), (*Flight clothing, Cleaning), (*Ammonium compounds, Cleaning compounds), Materials, Static electricity, Inhibition, Odors, Toilet articles.

An investigation of sanitizing, deodorizing, and antistatic agents is described. Recommendations are made for the use of quaternary ammonium compounds for sanitizing and deodorizing rubberized flight clothing and for the use of non-ionic detergents for rendering synthetic materials anti-static. (Author)

AD-609 167 Div. 14, 17
OTS Prices: HC $4.00/MF $1.00

Philco Research Labs., Newport Beach, Calif.
INVESTIGATION OF MECHANISMS FOR OXIDATION PROTECTION AND FAILURE OF INTERMETALLIC COATINGS FOR REFRACTORY METALS.
Summary rept. no. 2, 1 Jul 63-1 Jul 64,
by R. W. Bartlett and P. R. Gage. Jul 64, 137p
U-2660
Contract AF33 657 9170, Proj. 7312, Task 731201
ASD TDR63 753 P2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-421 084.

Descriptors: (*Refractory coatings, Silicides), (*Silicides, Intermetallic compounds), (*Intermetallic compounds, Oxidation), Films, Protective coverings, Refractory metals, Molybdenum compounds, Tungsten compounds, Oxides, Phase studies, Reaction kinetics, Thermochemistry, Halides, Transport properties, Vapors, Diffusion, Microstructure.

An investigation of the oxidation behaviour and related characteristics of bulk silicides and silicide coatings of molybdenum and tungsten was conducted. The study included (a) the growth kinetics of disilicide coatings, (b) marker experiments to identify diffusing species during disilicide coating formation, (c) a thermochemical analysis of halide enhanced silicon vapor transport during coating processing, (d) the growth rates of intermediate silicides in the MoSi2/Mo and WSi2/W systems using an electron microprobe technique, (e) the microstructure of protective oxide films grown on MoSi2 and the nonprotective oxidation products formed at low temperatures, (f) an analysis of the oxidation process and the resultant chemistry of the oxidation products based on thermochemical and diffusion rate data, (g) an experimental and analytical treatment of oxidation of molybdenum silicides at high temperatures, to 1600C, and reduced oxygen pressures, and (h) a correlation of experimental coating failure times, in normal oxygen atmospheres, with the required time to transform primary disilicide coatings to lower nonprotective silicide phases. (Author)

AD-609 182 Div. 14, 31
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
MOBILITY AND SOUND RADIATION MEASUREMENTS ON A CYLINDRICAL GLASS-REINFORCED-PLASTIC MODEL,
by Dwight L. Ludwig and Christopher J. Noonan.
Nov 64, 40p
Proj. S F013 05 03
DTMB 1867

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Laminated plastics, Glass textiles),

(*Stiffened cylinders, Acoustic properties), (*Vibration, Stiffened cylinders), (*Composite materials, Laminated plastics), (*Reinforcing materials, Glass textiles), Glass textiles, Cylindrical bodies, Structural shells, Damping, Resonance, Sound signals, Pressure, Acceleration, Underwater, Model tests, Submarine hulls.

Vibration and sound radiation characteristics are determined for a 6-in. ID, 28-in. long, internally ring-stiffened, glass-reinforced-plastic cylinder in the frequency range of 200 to 5300 cps. Drive-point mobility, an estimate of damping ratio, the mode shapes of resonant frequencies, and the sound pressure directivity patterns at resonances are presented. (Author)

AD-609 194 Div. 14, 22, 25
OTS Prices: HC $2.00/MF $0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SHOCK COMPRESSION OF PLEXIGLAS AND POLYSTYRENE,
by G. E. Hauver and A. Melani. Aug 64, 34p
Proj. 1M014501A33E
BRL 1259

Unclassified report

Descriptors: (*Acrylic resins, Compressive properties), (*Styrene plastics, Compressive properties), (*Shock waves, Terminal ballistics), Thermodynamics, Phase studies, Wave propagation, Velocity, Pressure, Volume, Explosive materials, Optical analysis, Graphics, Polarization, Tests.

Hugoniot curves for Plexiglas and polystyrene were established experimentally using optical and polarization techniques. Both Hugoniots show evidence of a phase transition, although the polystyrene transition is more clearly defined than that of Plexiglas. Separate polarization studies support the existence of both transitions. At the transitions, it is noted that the rarefaction velocity becomes equal to the shock velocity. The nature of the transitions is presently unknown. (Author)

AD-609 215 Div. 14, 4, 12
OTS Prices: HC $3.00/MF $0.75

Monsanto Research Corp., Dayton, Ohio.
SOLID REACTANT POLYURETHANE FOAM COMPOUND.
Rept. for 15 Apr 63-15 Apr 64,
by J. M. Butler and L. E. Erbaugh. Aug 64, 86p
Contract AF33 657 11285, Proj. 7381, Task 738101
ML TDR64 258

Unclassified report

Descriptors: (*Foams, Isocyanate plastics), (*Isocyanate plastics, Foams), (*Expanded plastics, Organic compounds), Hydrocarbons, Polymers, Composite materials, Alcohols, Heat of reaction, Catalysis, Aerospace craft, Aging (Materials), Vacuum, Powders.

Work was directed toward the development of a one-package composition which, in space environment, on localized thermal initiation would self-propagate a reaction to give a rigid polyurethane foam. Calculations and calorimetric measurements showed the theoretical possibility of a self-propagating reaction from localized initiation. However, in practice, this goal was not attained. Improved formulations were developed based on tolidine diisocyanate and polyoxypropylene polyols. These compositions when thermally initiated under vacuum (.00002 torr) foam and cure to rigid foams. Initiation temperatures and heat input requirements are less than for previously developed formulations. One-package formulations thermally convertible at atmospheric pressure to polyurethane foams were also developed. (Author)

AD-609 223 Div. 14, 12
OTS Prices: HC $5.00/MF $1.00

Goodyear Aerospace Corp., Akron, Ohio.
SOLAR REFLECTOR FOAMING TECHNOLOGY DEVELOPMENT,
by Paul Swanson. Dec 64, 157p GER-11755
Contract AF33 657 10165, Proj. 3145, Task 314502
APL TR64 128

Unclassified report

Descriptors: (*Reflectors, Solar radiation), (*Inflatable structures, Reflectors), (*Foams, Inflatable structures), Mirrors, Coatings, Aluminum coating, Test equipment, Reflection, Emissivity, Absorption, Thermal conductivity, Creep, Compressive properties, Stresses, Shear stresses, Strain (Mechanics), Thermal radiation, Loading (Mechanics), Thermal expansion, Tables, Satellites (Artificial), Vacuum, Spacecraft, Thermal insulation, Films, Polyethylene plastics.

Detailed study, test, and fabrication of 2-foot and 10-foot diameter solar collectors have demonstrated that it is not practical to use a pressure distributed foam system to foam large size aluminized Mylar solar reflectors in space. The report discusses design of the mixer unit and fabrication equipment, gives results of reflectance, absorptance, and emissivity testing, and describes the fabrication of two-foot and ten-foot diameter inflatable mirrors. Details of the testing program to determine the physical properties of mechanically mixed foam are included in an appendix. (Author)

AD-609 244 Div. 14, 4, 31
OTS Prices: HC $3.00/MF $0.75

Monsanto Research Corp., Dayton, Ohio.
FIRE-RESISTANT HYDRAULIC FLUID FOR SUBMARINES.
Final rept. for 1 Oct 63-1 Dec 64,
by E. S. Blake, R. E. DeBrunner, and J. A. Webster.
1 Dec 64, 83p
Contract NObs90095

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Hydraulic fluids, Submarines), (*Submarines, Hydraulic fluids), (*Flammability, Hydraulic fluids), Synthesis (Chemistry), Esters, Phosphates, Phosphorus compunds, Fluid dynamic properties, Molecular structure, Chemical properties, Viscosity, Fluorine compounds, Compatibility, Paints, Elastomers, Seals (Stoppers), Electric insulation, Tests, Test methods.

Synthesis and evaluation data on three classes of phosphorus esters as possible base stocks for fire-resistant hydraulic fluids for submarines are reported. The classes are: phosphates, phosphinates, and phosphoramidates. They were evaluated for fire resistance (AIT, 1300. molten metal test, flash and fire points); fluid properties (viscosities, ASTM slopes, pour points); and compatibility with paint ring seals, and electrical conduit sheathing presently used in submarines. Detailed structure/property correlations are presented for the three classes. Fluorine-containing phosphoramidates have been synthesized that possess better ASTM slopes and far superior paint and elastomer compatibility than MIL-H-19457, while retaining fire resistance comparable to MIL-H-19457. (Author)

AD-609 247 Div. 14, 4, 12
OTS Prices: HC $4.00/MF $1.00

Carbon Products Div., Union Carbide Corp.,

Lawrenceburg, Tenn.
IMPROVED GRAPHITE MATERIALS FOR HIGH-TEMPERATURE AEROSPACE USE. VOLUME II. DEVELOPMENT OF GRAPHITE-REFRACTORY COMPOSITES.
Rept. for 1 May 63-30 Apr 64.
Oct 64, 143p
Contract AF33 657 11171, Proj. 7350, Task 735002
ML TDR64 125 V2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy. See also AD-608 071.

Descriptors: (*Composite materials, Graphite), (*Graphite, Aerospace craft), (*Refractory materials, Composite materials), Oxidation, Coatings, Stability, Protective coverings, Corrosion inhibition, Oxides, Heat-resistant materials, Reaction kinetics, Graphics, Zirconium, Silicon, Niobium, Boron, Cerium, Lanthanum, Rocket motors.

New graphite-base refractory composites were developed through the selective substitution of the components in grade JTA. Studies were conducted on the following composite changes: zirconium, silicon and niobium replacement of boron; and niobium, cerium and lanthanum replacement of silicon. Studies of graphite-oxide reactions have provided information concerning the stability of oxide coatings in contact with carbon bodies. The most oxidation-resistant composite was JT-0981 in which the boron was completely replaced with silicon. This material exhibited excellent performance at 1700, 1800, 1900, and 2000C; however, at lower temperatures, no protective coating was formed and the performance was poor. Plasma tests conducted at 1900C on the front face of JTA samples shows its excellent oxidation resistance. Similar tests on JT-0981 were stopped when the low temperature areas on the samples were losing material faster than the hot face.

AD-609 264 Div. 14, 4, 17
OTS Prices: HC $1.00/MF $0.50

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia Pa.
EFFECT OF HEXAVALENT CHROMIUM CONTENT ON PERFORMANCE OF CHROMATE FILMS.
17 Nov 64, 10p
Task RRMA05 010 200 1R007 08 01
NAEC-AML 2065

Unclassified report

Descriptors: (*Coatings, Aluminum), (*Chromates Corrosion inhibition), (Aluminum, Corrosion), (*Corrosion inhibition, Films), Chromium, Quantitative analysis, Paints, Adhesion, Salts, Sprays, Resistance (Electrical), Panels (Structural), Life expectancy, Effectiveness.

An analytical method, developed to determine relative amounts of Cr (6+) and Cr (3+) in a chromate film makes possible correlative studies of chromium content and film properties such as salt spray life, electrical resistance and paint adhesion. For the proprietary film studied, salt spray life and electrical resistance increase with increasing soluble Cr (6+) content. Removing the Cr (6+) by bleaching or rendering it insoluble by heating, decreases salt spray life and electrical resistance. The salt spray life of a bleached film which has been heated is approximately the same as that of a bleached film which has not been heated. The effect of chromium content and chromium species on paint adhesion is not clear cut as yet. These preliminary tests indicate pretreatment to be of more significance. (Author)

AD-609 299 Div. 14, 22, 31
OTS Prices: HC $1.00/MF $0.50

Naval Ammunition Depot, Crane, Ind.
THE DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR THE MK 21 TYPE SUBMARINE LOCATION MARKER,
by Frank A. Niehaus. 5 Nov 64, 17p
NAD-CI rdtr48

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Expanded plastics, Styrene plastics), (*Packaging, Markers), (*Markers, Containers), (*Submarine, Markers), Costs, Tests, Drop testing, Vibration, Loading (Mechanics).

An improved method for packaging the Mk 21, 22, 23 or 24 Submarine Location Marker and Mk 27 Submarine Location Marker has been developed and evaluated as described in this report. The recommended container is made of foamed polystyrene and will replace the present metal container. The polystyrene foam container will decrease the cost of packaging by more than ninety percent, in addition to permitting improved handling by an extensive reduction in container weight. (Author)

AD-609 318 Div. 14
OTS Prices: HC $1.00/MF $0.50

Socony Mobil Oil Co., Inc., Paulsboro, N. J.
STUDY AND EVALUATION OF THE OXIDATIVE AND DEPOSIT-FORMING PROPERTIES OF HIGH TEMPERATURE LUBRICANTS.
Rept. for 1 Aug 63-31 Mar 64,
by S. J. Leonardi and E. A. Oberright. Nov 64, 16p
Contract AF33 657 11741, Proj. 3044, Task 304401
ASD TDR62 222 P3

Unclassified report

Descriptors: (*Oils, Oxidation), (*Oxidation, Oils), (*Lubricants, Oxidation), (*Oxidation, Lubricants), High tempterature research, Test methods, Test equipment, Turbines, Scale.

A series of high temperature oils has been evaluated in a high temperature thin film oxidation unit. The apparatus measures oxygen consumption and deposits formed by the oils in thin films on a rotating heated disk. Data were obtained at several film thicknesses and contact times which were varied by changing the rate at which the oil is passed over the disk. At the optimum oil flow rate, correlation of disk cleanliness with engine deposition data was excellent. A brief exploratory study indicated that provision for bulk oxidation in addition to the high temperature thin film oxidation could further improve the thin film oxidation unit as a screening tool. (Author)

AD-609 319 Div. 14, 4, 25, 30
OTS Prices: HC $5.00/MF $1.00

New York State Coll. of Ceramics, Alfred Univ.
USE OF A MASS SPECTROMETER TO STUDY THE HIGH-TEMPERATURE KINETICS OF THE VAPORIZATION OF NON-STOICHIOMETRIC TiO2.
Rept. for Aug 60-Jun 64, doctoral thesis,
by Samuel F. Hulbert. Oct 64, 177p
Contract AF33 616 7615, Proj. 7350, Task 735001
ML TDR64 289

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Mass spectroscopy, Vaporization), (*Titanium compounds, Oxides), (*Sublimation, Oxides), (*Spectrum analyzers, High-temperature research), Ionization, Ceramic materials, Vacuum, Phase studies, Reviews, Test methods.

In order to demonstrate the feasibility of studying the high-temperature kinetics of vaporization in a solid source (combination surface ionization-electron affinity) mass spectrometer, the kinetics of the vaporization of non-stoichiometric TiO2 under high vacuum were observed between 1115K and 2045K. A van't Hoff differential method analysis was performed on the raw data to determine the reaction-rate order. A first-order reaction-rate process was indicated in both cases. Rate constants for both processes, as well as for the overall vaporization on non-stoichiometric TiO2, were calculated at approximately 50K intervals between 1115K and 2045K. An Arrhenius-type analysis was performed and activation energies were observed. A thorough investigation was made of the possible systematic and random errors involved in using a solid source mass spectrometer to study the kinetics of high-temperature vaporization. (Author)

AD-609 348 Div. 14, 4, 25
OTS Prices: HC $2.00/MF $0.50

ManLabs., Inc., Cambridge, Mass.
THERMODYNAMICS OF INTERSTITIAL SOLID SOLUTIONS AND REFRACTORY COMPOUNDS. VAPORIZATION KINETICS OF NON-STOICHIOMETRIC COMPOUNDS.
Semi-annual progress rept. no. 2, 1 Sep 63-1 Mar 64, by Harold Bernstein and Larry Kaufman. 15 Mar 64, 45p
Contract AF33 657 9826
NP 14535

Unclassified report

See also AD-608 836.

Descriptors: (*Refractory materials, Thermodynamics), (*Solid solutions, Thermodynamics), (*Sublimation, Dynamics), Vaporization, Phase studies, Refractory metals, Carbides, Nitrides, Oxides, Mathematical models, Ceramic materials.

The purpose of the investigation is to calculate the vaporization kinetics of non-stoichiometric phases for both congruent and non-congruent vaporization based on the following assumptions: (1) The mass transport of vaporizing species is not diffusion limited. (2) The solid and vapor phases are in quasi-static equilibrium. (3) The effective surface area remains constant. (4) No molecular vaporization occurs. (5) The vaporization rates of the individual constituents are given by the Langmuir rate equation. (6) The thermodynamic properties of the non-stoichiometric solid and vapor phases are described by the Schotty-Wagner lattice defect model developed by Kaufman, et al for refractory, interstitial compounds.

AD-609 351 Div. 14, 25
OTS Prices: HC $2.00/MF $0.50

Honeywell Research Center, Hopkins, Minn.
GRAIN BOUNDARIES AND THE MECHANICAL BEHAVIOR OF MAGNESIUM OXIDE,
by R. B. Day and R. J. Stokes. Dec 64, 43p
HR-64-292
Contract AF33 615 1282

Unclassified report

Paper presented at conference on 'Role of Surfaces and Grain Boundaries in Ceramics' at Raleigh, N. C., 16-18 Nov 64.

Descriptors: (*Magnesium compounds, Oxides), (*Grain boundaries, Ceramic materials), (*Oxides, Ceramic materials), (*Ceramic materials, Mechanical properties), Crystal lattice defects, Single crystals, Crystal substructure, Heat-resistant materials, Recrystallization, Porosity, Deformation, Crup, Metallography.

The paper compares the mechanical behavior of magnesium oxide single crystals and polycrystals at different temperatures. Single crystals show increasing interpenetratability and multiplicity of slip systems at elevated temperatures. Above 1700C slip is very flexible, i.e., slip systems with different Burgers vectors completely interpenetrate each other and slip occurs over a variety of slip planes. Furthermore, above 1600C rearrangement of dislocations by polygonization is observed and in certain cases recrystallization can be obtained.

AD-609 367 Div. 14, 25
OTS Prices: HC $3.00/MF $0.75

North Carolina Univ., Chapel Hill.
PROGRESS IN MATERIALS RESEARCH .
Annual technical progress rept. for 1 Jul 63-30 Jun 64.
Jul 64, 55p
Contract SD100

Unclassified report

Descriptors: (*Materials, Scientific research), (*Crystals, Scientific research), Semiconductors, Electrons, Ions, Molecules, Synthesis (Chemistry), Inorganic compounds, Crystal structure, Crystal lattices, Liquids, Thermodynamics, Crystal lattice defects, Energy, Superconductivity, Magnetism, Magnetic resonance, Electrochemistry, Chemical analysis, Organic compounds.

Contents:
Featured research: The organic crystals group
Summaries of research progress: electrons in ions, molecules, and molecular crystals; inorganic syntheses; crystal structure; lattice dynamics and thermodynamics; imperfections in crystals; electron energy bands in crystals; superconductivity; magnetism and magnetic resonance; liquids; electrochemistry; analytical techniques.

AD-609 391 Div. 14, 4, 31
OTS Prices: HC $1.00/MF $0.50

American Oil Co., Whiting, Ind.
DEVELOPMENT OF NONFLAMMABLE HYDRAULIC FLUID.
Bi-monthly progress rept. no. 4, 1 Oct-1 Dec 64, by K. R. Bunting, A. M. Dobry, E. A. Swakon, P. C. Vienna, and L. W. Mixon. 1 Dec 64, 18p
Contract NObs90267, Proj. SR001 03 01, Task 606

Unclassified report

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), Flammability, Lubricants, Polymers, Polyethylene plastics, Viscosity, Toxicity, Storage, Handling, Corrosion inhibition, Submarines, Pumps, Compatibility, Sea water.

The object of the study is the development of a water-base hydraulic fluid which (1) yields a fire-resistant non-aqueous residue, (2) is compatible with materials of construction and sea-water contamination, (3) satisfactorily lubricates shipboard pumps, (4) presents no unusual storage or handling problems, and (5) exhibits no toxicological hazards under conditions of use. Low-density polyethylene can be chlorophosphonated by reaction with phosphorus trichloride and oxygen. Hydrolysis and neutralization produces products which show considerable promise as thickeners. The product from

21,000-molecular-weight polyethylene, neutralized to a pH of 8.0 with sodium hydroxide, produces a fluid which (1) has the desired viscosity, (2) is shear stable in tests using a Raytheon Sonic Oscillator, (3) can be rendered non-corrosive to iron, copper, aluminum, zinc, and silver braise by the addition of 1.0% of sodium chromate or sodium dichromate, (4) has no deleterious effect on Buna N rubber, (5) is compatible with 10% synthetic sea water, (6) is non-toxic and non-irritating, and (7) appears to produce non-aqueous residues having satisfactory flammability characteristics. (Author)

AD-609 405 Div. 14, 22
OTS Prices: HC $2.00/MF $0.50

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
RESISTANCE OF PLASTICS TO OUTDOOR EXPOSURE, by Frederick J. H. Blinne and Lester E. Day.
Apr 64, 45p
Proj. 1A024401A110
PA TR2102 add. 5 Unclassified report

See also PB-160 612, PB-160 588 and -160 589, PB-166 512.

Descriptors: (*Plastics, Weatherproofing), (*Weatherproofing, Plastics), (*Ordnance, Plastics), Environmental tests, Arctic regions, Tropical tests, Vinyl plastics, Polyester plastics, Polyethylene plastics, Styrene plastics, Polyvinyl chloride, Epoxy plastics, Acrylic plastics, Acetal plastics, Polyamide plastics, Nylon, Laminated plastics, Glass textiles, Butyl rubber, Mechanical properties, Nomographs, Stresses, Tensile properties.

This report presents stress-strain diagrams showing the tensile properties of 32 sets of samples of plastics before exposure, after being stored for three years in the dark under standard laboratory conditions, and after outdoor exposure for periods up to three years in three climates, temperate, arctic and tropical.

15. Mathematics

AD-608 944 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND NONLINEAR FILTERING THEORY,
by R. E. Bellman, H. H. Kagiwada, R. E. Kalaba, and R. Sridhar. Dec 64, 19p RM-4374-PR
Contract AF49 638 700
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Matrix algebra, Nonlinear differential equations), (*Nonlinear differential equations, Theory), (*Boundary value problems, Adaptive control systems), Vector analysis, Functional analysis, Numerical analysis, Differential equations, Functions, Equations, Invariance, Nonlinear systems, Dynamic programming.

Suppose that a system is undergoing a process which we believe can be described by the differential equation dx/dt= g(x, t). On the time interval (0, T) we observe the function x, in a noisy manner, and denote this experimental function by the symbol y. We wish to determine the state of the system at time t = T which is such that J is minimized, where J = the integral with respect to dt, from 0 to T, of (x(t) - y(t)) to the second power. Many problems of orbit determination and adaptive control are of this type. A solution is suggested in both the scalar and vector cases, which makes use of certain ideas from the theory of invariant imbedding, and some numerical examples are provided. (Author)

AD-608 972 Div. 15
OTS Prices: HC $3.00/MF $0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
CONTRIBUTIONS TO THE QUALITATIVE THEORY OF DIFFERENTIAL EQUATIONS (TOPOLOGICAL DYNAMICS), VOL. 1,
by T. R. Jenkins, W. E. Johnson, and C. M. Petty.
1963, 97p LMSC-6-74-64-44
Unclassified report

Research supported under the Lockheed Independent Research Program 61-7424-2403.

Descriptors: (*Differential equations, Topology), (*Topology, Differential equations), Abstracting, Set theory, Algebra, Equations, Recursive functions, Inequalities, Real variables, Algebraic topology, Motion, Invariance, Calculus of variations, Transformations (Mathematics), Differential geometry, Theory.

Contents:
Minimal center of attraction; Recurrent motions; Central motions of dynamical systems; Remarks on the proof of Birkhoff's ergodic theorem; Topological dynamics in C(X), preliminary report; Differential equations-examples; Existence of half trajectories in prescribed regions and asymptotic orbital stability; Parallelizability of dynamical systems; Disconjugate solutions of second order linear equations.

AD-608 981 Div. 15
OTS Prices: HC $1.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
FUZZY SETS,
by L. A. Zadeh. 16 Nov 64, 19p ERL-64-44
Grants AF AFOSR139 64, NSF GP2413
Unclassified report

Supported in part by the Joint Services Electronics Program (U.S. Army, U. S. Navy and U. S. Air Force).

Descriptors: (*Set theory, Combinatorial analysis), (*Combinatorial analysis, Set theory), Convex sets, Separation, Theorems, Mathematical logic, Identities, Algebra, Pattern recognition, Classification.

A fuzzy set is a class of objects without a precisely defined criterion of membership. Such a set is characterized by a membership (characteristic) function which assigns to each object a grade of membership ranging between zero and one. The notions of inclusion, union, intersection, complement, convexity, etc., are extended to such sets, and various properties of these notions in the context of fuzzy sets are established. In particular, a separation theorem for convex fuzzy sets is proved without requiring that the fuzzy sets be disjoint. (Author)

AD-608 990 Div. 15
OTS Prices: HC $3.00/MF $0.75

Boeing Scientific Research Labs., Seattle, Wash.
PROGRAMMING UNDER UNCERTAINTY: THE COMPLETE PROBLEM,
by Roger Wets. Oct 64, 57p D1-82-0379;
Boeing Math-370
Contract Nonr-22283
Unclassified report

Prepared in cooperation with California Univ., Berkeley.
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Also available from the author.

Descriptors: (*Linear programming, Probability), (*Probability, Linear programming), (*Convex sets, Linear programming), Mathematical programming, Decision theory, Statistical functions, Matrix algebra.

We define the complete problem of a two-stage linear programming under uncertainty, to be: Minimize z(x) = E sub xi (c x + q(+)y(+) + q(-)y(-)) subject to A x = b; T x + I y(+) + I y(-) = xi x > or = O y(+) > or = y(-) > or = O where x is the first-stage decision variable, the pair (y(+), y(-)) represents the second-stage decision variables. In order to solve this class of problem, we derive a convex programming problem, whose set of optimal solutions is identical to the set of optimal solutions of our original problem. This problem is called the equivalent convex programming. If the random variable xi has a continuous distribution, we give an algorithm to solve the equivalent convex program. Moreover, we derive explicitly the equivalent convex program for a few common distributions. (Author)

AD-608 992 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOMOGRAM FOR LOG-NORMAL DISTRIBUTION FUNCTIONS,
by Alan J. Truelove. Nov 64, 4p P-3015
Unclassified report

Descriptors: (*Nomographs, Statistical distributions), (*Statistical distributions, Nomographs), Statistical functions, Mathematics.

The nomogram yields cumulative log-normal distribution functions, F(y), when the mean and standard deviation are specified within certain ranges. These functions are all straight lines, since logarithmic normal graph paper was used in constructing the nomogram.

AD-608 994 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TIMING OF CHECK-OUT BEFORE A CRITICAL EVENT,
by Alan J. Truelove. Nov 64, 13p P-3014
Unclassified report

Descriptors: (*Checkout procedures, Optimization), (*Optimization, Checkout procedures), Statistical functions, Stochastic processes, Probability, Theory, Mathematics, Maintenance, Analysis, Equations.

A critical event is scheduled at time T, at which time it is essential for a given system, with constant failure rate, to be operable. Let out 'pre-event period,' or countdown for this critical event start at time zero. Suppose we perform precisely one checkout (assumed instantaneous) of the system during the pre-event period. If the system is found to be down, we immediately initiate repair (the question of whether this procedure is optimal has been considered in Ref. 1); the duration of repair follows a known distribution (not dependent on the nature of the system failure).

AD-608 996 Div. 15, 13
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
AN ANALYSIS OF CONVEYOR SYSTEMS,
by A. Alan B. Pritsker. Nov 64, 79p P-3016
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Queueing theory, Conveyors), (*Conveyors, Mathematical analysis), Probability, Feedback, Programming (Computers), Simulation.

Equations for the following performance measures for conveyor systems with no storage and no feedback are developed: expected number of busy channels, probability that the j(th) channel is busy, and the expected time for an item in the system when delays are included between service channels. An extension to the case where there is no storage in all but the last channel and infinite storage in the last channel is made. It is also shown that time delays between service channels do not affect the steady-state probabilities associated with the conveyor system. Tables of the performance measures are included for the queueing situations M/G/m and D/M/m applied to conveyor systems. Also tabulated are the probabilities that j channels are busy and that j channels are busy at the time of an arrival of an item for the M/G/m and D/M/m situations. It is proved that the D/M/m situation is superior to the M/G/m situation with regard to the performance measures. Recirculation ow items is then considered and an equation for the expected number of busy channels is developed. A simulation program is used to obtain the probabilities associated with the conveyor system when recirculation is permitted. It is observed that the value of the feedback delay does not affect the steady-state probabilities. (Author)

AD-609 067 Div. 15
OTS Prices: HC $4.00/MF $1.00

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
ASYMPTOTIC THEORY OF WAVE-PROPAGATION.
Research rept.,
by Robert M. Lewis. Oct 64, 103p EMP-200
Contract AF19 628 4065, Proj. 4603, Task 460302
AFCRL 64 854
Unclassified report

Descriptors: (*Wave transmission, Differential equations), (*Electromagnetic fields, Equations), (*Integral equations, Wave transmission), (*Differential equations, Wave transmission), Partial differential equations, Electromagnetic waves, Operators (Mathematics), Matrix algebra, Field theory, Fourier analysis, Vector analysis, Series, Theory, Acoustics, Scattering, Propagation, Oscillation, Hamiltonian, Complex variables, Cerenkov radiation, Transformations (Mathematics).

A general method is presented for finding asymptotic solutions of problems in wave-propagation. The method is applicable to linear symmetric-hyperbolic partial differential equations and to the integro-differential equations for the electromagnetic field in a dispersive medium. These equations may involve a large parameter lambda. In the electromagnetic case lambda is a characteristic frequency of the medium. The parameter may also appear in initial data or in the source terms of the equations, in a variety of different ways. This gives rise to a variety of different types of asymptotic solutions. The expansion procedure is a ray method, i.e., all the functions that appear in the expansion satisfy ordinary differential equations along certain space-time curves called rays. In general, these rays do not lie on characteristic surfaces, but may, for example, fill out the interior of a characteristic hypercone. They are associated with an appropriately defined group velocity. In subsequent papers the ray method developed here will be applied to acoustic wave propagation, Cerenkov radiation, transition radiation, and other phenomena of wave-propagation. (Author)

AD-609 100 Div. 15
OTS Prices: HC $7.00/MF $2.00

TRW Space Technology Labs., Los Angeles, Calif.
TABLES OF UPPER CONFIDENCE LIMITS ON FAILURE PROBABILITY OF 1, 2 AND 3 COMPONENT SERIAL SYSTEMS, VOLUME I,
by M. Lipow and J. Riley. Jul 59, 356p
STL/TR-59-0000-00756, STL/GM59-7630.4-26
Unclassified report

Descriptors: (*Reliability (Electronics), Statistical analysis), (*Statistical analysis, Reliability (Electronics)), Failure (Mechanics), Probability, Propulsion, Reliability, Mathematical analysis.

AD-609 161 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE ALGEBRA OF RESOLVING FLUXES IN RADIANT EXCHANGE,
by G. L. Polyak and V. N. Adrianov. 1 Dec 64, 14p
RSIC 331; TT 65 60461
Unclassified report

Trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1962, v. 5, no. 7, p. 70-77.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Algebra, Heat transfer), (*Electromagnetic waves, Algebra), (*Heat transfer,

Mathematical analysis), Integral equations, Determinants, Series, Numerical analysis, Resolution, Temperature.

Proposed here is an effective system of equations for calculating radiant exchange in an arbitrary system of bodies. By means of transition into resolvant (solving) fluxes, it is possible to separate temperature factors and opticgeometric parameters of a radiating system.

AD-609 195 Div. 15
OTS Prices: HC $1.00/MF $0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE MATHEMATICAL ANALYSIS OF A SIMPLE DUEL,
by Arthur D. Groves. Aug 64, 24p
Proj. 1M02301A098
BRL 1261

Unclassified report

Descriptors: (*Mathematical analysis, Game theory), (*Game theory, Kill probabilities), Statistical processes, Analysis of variance, Dynamic programming, Probability, Matrix algebra, Vector analysis, Series, Sequential analysis.

The principles and techniques of simple Markov processes are used to analyze a simple duel to determine the limiting state probabilities (i.e., the probabilities of occurrence of the various possible outcomes of the duel). The duel is one in which A fires at B at a rate of r sub A shots per minute starting at time t = o and with a single shot kill probability of P sub A and B fires at A at a rate of r sub B shots per minute starting at time = delta and with a single shot kill probability of P sub B, and this exchange of fire continues until either A or B, or both are killed. (Author)

AD-609 203 Div. 15
OTS Prices: HC $3.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
THE APPROXIMATION OF DIFFERENTIABLE FUNCTIONS BY POLYNOMIALS.
Revised ed.,
by F. D. Murnaghan and J. W. Wrench, Jr. May 60, 52p
DTMB 1175

Unclassified report

Descriptors: (*Iterative methods, Transcendental functions), (*Polynomials, Iterative methods), (*Transcendental functions, Iterative methods), Bessel functions, Tables, Real variables, Matrix algebra, Determinants, Integral equations, Numerical analysis, Sequences.

An iterative procedure is developed for the expeditious determination of accurate approximations to the coefficients of the polynomial of preassigned maximum degree that best approximates a given differentiable function over a finite interval of the argument, in the sense that the greatest absolute deviation of the polynomial from the function is less than that of any other polynomial of the same or smaller degree. Detailed examples are given of the application of this procedure to the optimum approximation by polynomials of several elementary transcendental functions. In the final section of the body of this report a sufficient condition for the convergence of the iterative procedure is given. Briefly stated, this condition is that the difference between the given differentiable function and the polynomial of degree < or = n with which the iterative procedure is begun should have n + 2 points in the given finite interval at which it assumes extreme values which alternate in sign, n being the preassigned maximum degree. Appended to the report are tables of extended approximations to certain Bessel-function values especially useful in applications of this method to trigonometric functions. The tables are preceded by an explanation of the procedure followed in their calculation. (Author)

AD-609 219 Div. 15
OTS Prices: HC $2.00/MF $0.50

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
A METHOD FOR THE NUMERICAL INTEGRATION OF A SPECIAL CLASS OF SECOND-ORDER DIFFERENTIAL EQUATIONS,
by Robert F. Boylan. Aug 64, 30p R-463
Contract AF04 694 553, Proj. 52 225

Unclassified report

Descriptors: (*Numerical analysis, Differential equations), (*Differential equations, Numerical analysis), (*Integration, Iterative methods), Sequential analysis, Vector analysis, Corrections, Errors, Digital computers.

AD-609 259 Div. 15
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
AN EXACT ASYMPTOTICALLY EFFICIENT CONFIDENCE BOUND FOR RELIABILITY IN THE CASE OF THE WEIBULL DISTRIBUTION.
Technical rept. no. 75,
by M. V. Johns, Jr. and G. J. Lieberman. 18 Dec 64, 53p
Contract Nonr22553, Proj. NR042 002

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Statistical analysis, Reliability), (*Statistical distributions, Reliability), Stochastic processes, Analysis of variance, Tables, Probability, Statistical functions, Transformation (Mathematics).

This report presents a simple method for obtaining exact lower confidence bounds for reliabilities (tail probabilities) for items whose life times follow a Weibull distribution where both the 'shape' and 'scale' parameters are unknown. These confidence bounds are obtained both for the censored and non-censored cases and are asymptotically efficient. They are exact even for small sample sizes in that they attain the desired confidence level precisely. The case of an additional unknown 'location' or 'shift' parameter is also discussed in the large sample case. Tables are given of exact and asymptotic lower confidence bounds for the reliability for samples sizes of 10, 15, 20, 30, 50 and 100 for various censoring fractions. (Author)

AD-609 287 Div. 15, 12, 19
OTS Prices: HC $3.00/MF $0.75

Army Map Service, Washington, D. C.
INTEGRATION ORBITS FOR SATELLITES,
by Soren W. Henriksen. Aug 64, 77p
AMS TR47

Unclassified report

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Satellites (Artificial)), (*Integration, Orbital trajectories), Geophysics, Geodesics, Differential equations, Partial differential equations, Nonlinear differential equations, Numerical analysis, Integral equations, Motion, Gravity, Tables, Polynomials, Synthesis.

The differential equations of motion of a rigid body in the earth's gravity field and atmosphere are discussed and a method for their solution by numerical integration given. Also considered are algorithms for the mechanical syntheses of differential and integral equations, with the intention of eventually mechanizing the mathematics as well as the computation of such problems. There are numerous and extensive tables of function and coefficients included. (Author)

AD-609 320 Div. 15
OTS Prices: HC $3.00/MF $0.75

Institute for Research in the Behavioral, Economic, and Management Sciences, Purdue Univ., Lafayette, Ind.
CONSISTENCY OF LEAST SQUARE ESTIMATORS OF COEFFICIENTS IN EXPLOSIVE STOCHASTIC DIFFERENCE EQUATIONS,
by Thomas Joseph Muench. Aug 64, 65p
IRBEMS-IP-79
Contract Nonr11016, Proj. NR047 026
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Least squares method, Theorems), (*Stochastic processes, Difference equations), (*Difference equations, Stochastic processes), Probability, Matrix algebrs, Statistical processes.

This report contains generalizations of Rao's and Rubin's proofs concerning consistency of least square estimators.

AD-609 369 Div. 15, 2
OTS Prices: HC $1.00/MF $0.50

Brown Univ., Providence, R. I.
EXTENSIONS TO THEORY OF TIME-SERIES ANALYSIS.
Quarterly rept. no. 9, 1 Aug-31 Oct 64,
by Walter Freiberger. 31 Oct 64, 8p
Contract DA36 039SC87222, Proj. 3A99 25 002
Unclassified report
See also AD-606 187.

Descriptors: (*Statistical analysis, Theory), (*Series, Time), (*Statistical processes, Meteorology), (*Probability, Weather forecasting), Mathematical prediction, Correlation techniques, Stochastic processes, Matrix algebra, Vector analysis.

During the quarter, various questions of meterological prediction have been considered. One of the difficulties of applying known techniques of statistical analysis of random processes to meteorological problems is that the processes occuring in such applications cannot be considered spatially stationary. Let us consider an idealized example. In the dynamical statistical approach one is concerned with random solutions of differential equations. The initial values of the solution u(x,t) were assumed to be u(x,o) = v(x). In a typical meteorological situation, the values of the meteorological quantities are observed at a sequence of weather-stations. So it is assumed that v(x) is observed at a sequence of points x = x sub m. To solve the prediction problem, the initial field is obtained by interpolating between the values v(x) sub m. v(x) is estimated by that linear combination of the observed stochastic variables which has the smallest mean square error.

AD-609 409 Div. 15
OTS Prices: HC $1.00/MF $0.50

Michigan State Univ., East Lansing.
ON A PARTIAL DIFFERENTIAL EQUATION OF EPIDEMIC THEORY. I,
by J. Gani. 18 Dec 64, 13p RM-122-JG-3
Contract Nonr258705
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Partial differential equations, Stochastic processes), (*Stochastic processes, Partial differential equations), Probability, Integral transforms, Integration, Theory.

16. Medical Sciences

AD-608 985 Div. 16
OTS Prices: HC $2.75/MF $1.00

Office of Naval Research, Washington, D. C.
WORKING CONFERENCE (NO. 2) ON THE LIQUID NITROGEN PROCESS OF BLOOD PRESERVATION HELD DECEMBER 12-13, 1963 AT MARVEL HALL, AMERICAN CHEMICAL SOCIETY, WASHINGTON, D. C.,
1963, 130p
ONR ACR-94

Unclassified report

Descriptors: (*Blood, Preservation), (*Freezing, Blood), Blood transfusions, Erythrocytes, Enzymes, Nitrogen, Oxygen, Hemoglobin, Blood coagulation, Immunology, Blood groups, Hemolysis, Labeled substances, Additives, Blood plasma, Electrolytes (Physiology), Ph, Membranes (Biology), Osmosis, Containers, Monkeys, Dogs, Humans, Military medicine, Symposia.

A report on the second working conference on the liquid nitrogen process of blood preservation is presented. (Proceedings of the first conference were not published.) The papers and subsequent discussions are concerned with the pertinent aspects of freezing, stockpiling, and thawing of whole human blood for the purpose of transfusion, particularly in military situations. The functionality of the erythrocyte following transfusion is considered. Some problems under discussion are: Is the erythrocyte able to carry on its capacity to dissociate oxygen. What about the enzymology of the erythrocyte. Are the enzymes acting as they do normally in the body following the stress and strain of freezing and thawing. What about the immunology of the erythrocyte. What about the electrolyte shift. What about kidney function. Ph. And what happens to the haptoglobin-hemoglobin complex. Is haptoglobin regenerated rapidly, slowly, or is it hampered in the course following transfusion.

AD-609 006 Div. 16, 28
OTS Prices: HC $2.00/MF $0.50

Aeronautical Research Lab., Univ. of Kentucky, Lexington.
A MECHANICAL IMPEDANCE INVESTIGATION OF HUMAN RESPONSE TO VIBRATION.
Final rept. for Dec 62-Feb 64,
by Richard G. Edwards and Karl O. Lange.
Oct 64, 38p
Contract AF33 616 7766, Proj. 7231, Task 723101
AMRL TR64 91

Unclassified report

Descriptors: (*Vibration, Tolerances (Physiology)), (*Performance (Human), Vibration), Posture, Muscles, Acceleration tolerance, Stress (Physiology), Spacecraft, Space medicine, Test methods.

To help establish the dynamics of the human body the mechanical impedance was measured as two subjects were exposed to vertical sinusoidal motion at frequencies from 1 to 20 cycles per second. The impedance in the supine, lateral, and standing subject positions and its variation due to voluntary change in muscle tone and due to padding the support were determined. In all tests the frequency interval from 4 to 7 1/2 cycles per second was found to contain the initial whole body resonance. Nonlinearity of the response, as established by impedance dependence upon shaketable acceleration level, was observed by altering the peak shaketable acceleration from 0.2 to 0.35 to 0.5 g. The degree of nonlinearity was found to be dependent upon subject position as well as subject physiological differences. Changes in support padding and muscle tone produced substantial alterations in impedance but little variation of resonant frequencies. (Author)

AD-609 043 Div. 16
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE, VOLUME 3, NO. 11,
ed. by George Anastos. 1964, 23p
Contract DA49 193MD2238
TT 65 60425

Unclassified report

Descriptors: (*Bibliographies, Disease vectors), (*Disease vectors, Bibliographies), (*Insects, Bibliographies), Ticks, Mites, Rodents, Diptera, Arthropods, Bacteria, Spirochaeta, Protozoa, Rickettsia, Arboviruses, Virus diseases, Insect control, Insecticides, Diseases, Toxicity, Epidemiology, USSR, Eastern Europe, China.

AD-609 044 Div. 16
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE, VOLUME 3, NO. 12,
ed. by George Anastos. 1964, 18p
Contract DA49 193MD2238
TT 65 60426

Unclassified report

Descriptors: (*Bibliographies, Disease vectors), (*Disease vectors, Bibliographies), (*Insects, Bibliographies), Ticks, Mites, Rodents, Diptera, Arthropods, Bacteria, Spirochaeta, Protozoa, Rickettsia, Arboviruses, Virus diseases, Insect control, Insecticides, Diseases, Toxicity, Epidemiology, USSR, Eastern Europe, China.

AD-609 045 Div. 16
OTS Prices: HC $3.00/MF $0.75

Maryland Univ., College Park.
INDEX CATALOGUE TO RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE IN MEDICAL ENTOMOLOGY. VOLUME 5. MISCELLANEOUS ARTHROPODS.
1964, 97p
Contract DA49 193MD2238
TT 65 60427

Unclassified report

Descriptors: (*Indexes, Arthropods), (*Arthropods, Indexes), (*Bibliographies, Disease vectors), (*Disease vectors, Bibliographies), Lice, Arachnids, Coleoptera, Hemiptera, Hymenoptera, Orthoptera, Insects, Insect control, Insecticides, Rickettsia, Diseases, Animals, Parasites, Toxicity, Immunology, Epidemiology, Ecology, Eastern Europe, USSR, China.

AD-609 046 Div. 16
OTS Prices: HC $4.00/MF $1.00

Maryland Univ., College Park.
INDEX CATALOGUE TO RUSSIAN, CENTRAL AND

EASTERN EUROPEAN, AND CHINESE LITERATURE IN MEDICAL ENTOMOLOGY. VOLUME 4. MITES.
1964, 119p
Contract DA49 193MD2238
TT 65 60428

Unclassified report

Descriptors: (*Indexes, Mites), (*Mites, Indexes), (*Disease vectors, Bibliographies), (*Bibliographies, Disease vectors), Parasites, Parasitic diseases, Animals, Diseases, Rickettsia, Insects, Larvae, Ticks, Insect control, Insecticides, Ecology, Eastern Europe, USSR, China.

AD-609 105 Div. 16
OTS Prices: HC $3.00/MF $0.75

Army Medical Lab. (6th), Fort Baker, Calif.
ARMY MEDICAL LABORATORY ANNUAL RESEARCH PROGRESS REPORT, VOLUME III.
Rept. for 1 Jul 63-30 Nov 64,
by James A. Wilkerson, Adrian D. Mandel, Albert Leibovitz, John R. Seed, and Donald K. Hesson.
30 Nov 64, 70p
Proj. 3A012501A806 01, Task 1

Unclassified report

Includes work on Projs. 3A012501A818 01 and 3A012501A818 02.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Military medicine, Abstracting), (*Embryos, Pathology), (*Neisseriaceae, Penicillins), (*Tissue culture cells, Culture media), (*Trypanosoma, Biochemistry), (*Sulfadiazine, Neisseriaceae), Chromosomes, Viruses, Pregnancy, Anomalies, Children, Birth, Diseases, Immunology, Communicable diseases, Parasites, Foot and mouth disease virus, Test methods, Females, Males.

Contents:
Chromosome analysis and virus isolation studies of human embryos and fetuses
Studies on penicillin treatment failures of gonorrhea
Culture media for the growth and maintenance of tissue cell cultures
Inhibition of hexose and glycerol utilization by 2-Deoxy-D-Glucose in Trypanosoma gambiense and Trypanosoma rhodesiense
The characterization of hexokinase from Trypanosoma rhodesiense and Trypanosoma gambiense
Studies on sulfonamide resistance of Neisseria meningitidis.

AD-609 135 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OXYGENATION OF BRAIN TISSUES DURING AIR AND OXYGEN RESPIRATION WITH AN ADMIXTURE OF CO2,
by E. A. Kovalenko, V. L. Popkov, and I. N. Chernyakov. 23 Nov 64, 13p
FTD TT64 634, TT 65 60430

Unclassified report

Unedited rough draft trans. of Fiziologicheskii Zhurnal SSSR, 1964, v. 50, no. 2, p. 177-182.

Descriptors: (*Oxygen, Brain), (*Brain, Oxygen), (*Respiration, Carbon dioxide), Gases, Mixtures, Tissues (Biology), Hypoxia, Lungs, Blood analysis, Cerebral cortex, Polarographic analysis, Pressure, Adaptation (Physiology), Electroencephelography, USSR.

Conclusions: The oxygen tension in brain tissues (cortex and subcortex) during air respiration with 5 and 10% of CO2 increased as compared with the original up to 125 and 160%, respectively. Pure oxygen respiration caused an increase of pO2 in the brain tissues by 1.5-2 times. The gas mixture, which consisted of 95-90% of 02 and 5-10% of CO2, increased the oxygen tension in the brain tissues by 3-4 times. The obtained data showed that in complex with other methods of investigation, the polarographic determination of the oxygen tension can be a valuable criterion in determining the process of oxygenation of brain tissues. (Author)

AD-609 140 Div. 16, 5, 30
OTS Prices: HC $3.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RADIOELECTRONICS IN SPACE MEDICINE,
by I. T. Akulinichev, R. M. Baevskii, K. P. Zazykin, and V. R. Freidel'. 23 Nov 64, 68p
FTD TT64 836; TT 65 60435

Unclassified report

Unedited rough draft trans. of mono. Radioelektronika v Kosmicheskoi Meditsine, Moscow/Leningrad, 1964, p. 3-45 (Massovaya Radio Biblioteka (USSR) 1964, v. 505, p. 3-45).
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Space medicine, Data transmission systems), (*Data transmission systems, Space medicine), (*Astronauts, Physiology), Space flight, Space communication systems, Medical equipment, Telemeter systems, Space environmental conditions, Electrocardiography, Electroencephalography, Cosmic rays, Vibration, Acceleration, Weightlessness, Satellites (Artificial), Spacecraft cabins, USSR.

Instruments and research methods used in space medicine are described. Brief outlines are given concerning the operating principles and construction of the sensing, amplifying and other apparatus designed for use on spacecraft. The booklet is intended for radio engineers, medical technicians and radio amateurs who build their own equipment. (Author)

AD-609 141 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command Wright-Patterson AFB, Ohio.
AUTOMATIC CONTROL OF ALGAE CULTURE,
by E. A. Ivanov and I. V. Aleksandrova.
20 Nov 64, 15p
FTD TT64 247, TT 65 60436

Unclassified report

Unedited rough draft trans. of Uspekhi Sovremennoi Biologii (USSR) 1963, v. 56, no. 1(4) p. 90-97.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Space biology, Respiration), (*Algae, Space biology), (*Photosynthesis, Control systems), Automatic, Closed ecological systems, Air, Regeneration, Spacecraft cabins, Growth, Plants (Botany).

An indispensable condition for the accomplishment of long flights by man in outer space is the creation of systems of regeneration of the air, based on the process of the photosynthesis of green plants. Such a system of regeneration as a whole represents a quite intricate complex of equipment the control of which should be

effected automatically. The object of the automatic control in this system is the culture of one or several green plants, which in the process of photosynthesis accomplish the absorption from the air of the cabin the dioxide and the liberation of gaseous oxygen. At the present time it is considered as very probable that the plants to be used for this purpose would be single-celled algae, preferably different kinds of chlorella. The analysis of the rich experimental material devoted to the research of the process of photosynthesis of chlorella indicates, however, that for sufficiently full characterization of the culture of single-celled algae as the object of automatic control it is necessary to carry on a series of supplemental biological experiments, the makeup and specific nature of which cannot be clearly defined without making clear the problems and methods of automatic control of the culture.

AD-609 144 Div. 16
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
N. P. KRENKE AND HIS THEORY OF AGING AND REJUVENATION,
by G. N. Chernov. 23 Nov 64, 37p
FTD TT64 289; TT 65 60439

Unclassified report

Unedited rough draft trans. of mono. N. P. Krenke i Ego Teoriya Stareniya i Omolozheniya, Moscow, 1963, 116p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plants (Botany), Aging (Physiology)), (*Aging (Physiology), Plants (Botany)), Biology, Theory, Morphology (Biology), Cells (Biology), Regeneration, Reproduction (Physiology), Plant tissue, Life cycle, USSR.

One of the most acute and controversial problems of contemporary biology, the problem of the development and aging of the plant organism is discussed. The background and history of the establishment of the theory of the cyclical aging and rejuvenation of plants and the scientific content of the theory are considered, and an attempt is made to estimate its contemporary significance. The book also contains a brief outline of the life and work of the author of the theory of cyclic aging and rejuvenation of plants developed by a prominent Soviet botanist.

AD-609 146 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON CERTAIN DEBATABLE PROBLEMS OF ETIOLOGY AND PATHOGENESIS OF MALIGNANT TUMORS,
by I. M. Neiman. 10 Nov 64, 10p
FTD TT63 1142; TT 65 60441

Unclassified report

Unedited rough draft trans. of Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (USSR) 1958, v. 2, no. 3, p. 10-13.

Descriptors: (*Cancer, Etiology), (*Pathology, Cancer), Neoplasms, Tissues (Biology), Cells (Biology), Morphology (Biology), Viruses, Antigens and antibodies, Biosynthesis, Nucleoproteins, Medical research, USSR.

It is concluded that cancerogene induces in tissues the synthesis of 'cancerogenic' nucleoproteide. Further development of the process follows the path of synthetic reproduction in cells of this pathological substrate. In recent years literature has made broad use of the term 'virus-like formations' in application to the malignancy factor separable from the cell. It appears that this 'similarity' is based on nucleoproteidic formation and infectious viruses, malignancy factors, and many biologically active substances. It does not reflect the nature of the discussion about the endogeneous and exogeneous origination of malignant tumors which appears to be the basis in solving debatable problems of their etiology and pathogenesis.

AD-609 151 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CHARACTER OF CHANGES IN THE BLOOD IN PERSONS WINTERING AT THE VOSTOK STATION,
by I. I. Tikhomirov. 20 Nov 64, 7p
FTD TT64 285; TT 65 60451

Unclassified report

Unedited rough draft trans. of Sovetskaya Antarkticheskaya Ekspeditsiya. Informatsionnyi Byulleten' (USSR) 1961, no. 31, p. 44-47.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Blood, Low-temperature research), (*Cold weather tests, Blood), Blood analysis, Hematology, Blood counts, Hemoglobin, Erythrocytes, Leucocytes, Viscosity, Polar regions, Temperature, Blood diseases, Adaptation (Physiology), Moles, USSR.

Researches were conducted on a group of nine persons (men of average age, physically healthy); the content in the blood of hemoglobin was determined (by Sali's method) as well as the number of erythrocytes and leucocytes (computation in Goryaev's chamber); the reaction of the lowering of erythrocytes was investigated (by Panchenkov's method); the viscosity of the blood was tested (with Hess's viscosimeter); and the ratio of white blood cells was determined (by Schilling's method). The first series of investigations was conducted under normal conditions (on the ship at the time of proceeding to Antarctica) and taken as the starting norm--the others at different periods when wintering at the Vostok station.

AD-609 152 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CHANGES IN HIGHER NERVOUS ACTIVITY AND IN CERTAIN VEGETATIVE REACTIONS DURING LONG PERIODS OF RELATIVE ADYNAMIA AND ISOLATION,
by N. A. Agadzhanyan and Yu. P. Bizin. 23 Nov 64, 19p
FTD TT64 635; TT 65 60452

Unclassified report

Unedited rough draft trans. of Zhurnal Vysshei Nervnoi Deyatel'nosti (USSR) 1963, v. 13, no. 6, p. 953-962.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Central nervous system, Confined environments), (*Sensory deprivation, Performance (Human)), Peripheral nervous system, Adaptation (Physiology), Conditioned reflex, Motor reactions, Performance tests, Physical fitness, Space environmental conditions, Simulation, Space medicine, USSR.

Under long exposure to relative adynamia and isolation where there is a reduction in afferent pulses, a person experiences a significant loss of the normal functioning of the central nervous system. In the labortory of I. P. Pavlov it was demonstrated that when the peripheral ends of the three distance analysors (vision, hearing and olfactory) are simultaneously severed in a mature animal he will go into a deep sleep lasting 23-23.5 hours of the day. In lafer works it was noted that sequential severing of peripheral receptors sharply reduces motor activity and leads to a profound change in higher nervous activity. Consequently, in order to maintain the normal work capability of the organism, a minimum influx of extra- and interoceptive pulses is absolutely necessary. This article deals with the nature of the change of the higher nervous activity in man during long exposure to relative adynamia and isolation.

AD-609 205 Div. 16, 23
OTS Prices: HC $2.00/MF $0.50

Army Medical Research Lab., Fort Knox, Ky.
OPERATIONS AT HIGH TEMPERATURES. STUDIES OF MEN IN SIMULATED JUNGLE (HUMID) HEAT,
by L. W. Eichna, W. B. Bean, and W. F. Ashe.
18 Oct 43, 48p
Proj. 2 2 7 7 2 11 2 13 2 15 2 17 2 19
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Tropical tests, Military personnel), (*Acclimatization, Tropical tests), (*Heat tolerance, Military personnel), Simulation, Behavior, Performance (Human), Temperature, Humidity, Adaptation (Physiology), Tolerances (Physiology), Physical fitness, Medical examination, Clothing, Food, Water, Sleep, Alcohols, Urine, Blood analysis.

The purpose of these experiments was to study the behavior and performance of military personnel when exposed to the high temperature and high humidity of a simulated jungle climate. Tests were carried out under controlled conditions in the Laboratory Hot Room, in a manner similar to that employed in the previous desert studies. For most men, work in humid heat of the degree imposed in these experiments is at first difficult or impossible. By a process of acclimatization man adapts himself to work in the heat. He then works without subjective complaints and with little or no disturbance of bodily functions. Acclimatization appears to be a complex physiologic readjustment which cannot be adequately defined or completely determined by a few simple physiologic measurements. Nevertheless, this adaptation is accompanied by certain physiologic changes which serve as general indices of the whole process. In this report some of these physiologic changes are discussed and represented by a series of charts.

AD-609 257 Div. 16, 30, 31
OTS Prices: HC $2.00/MF $0.50

Navy Experimental Diving Unit, Naval Weapons Plant, Washington, D. C.
COMPUTATION OF HELIUM-OXYGEN DECOMPRESSION TABLES,
by G. G. Molumphy. 25 Sep 50, 29p
Proj. NS186 201, Task 4
NEDU 7 50
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Decompression, Tables), (*Tables, Decompression), Helium, Oxygen, Time, Diving, Pressure, Tissues (Biology), Medical research.

The tables are computed to the nearest foot - less than 0.5 is dropped, 0.5 or more is considered an additional foot. When computing the time of the final stop, any fraction of a minute is considered an additional minute. At stops other than the final stops, the saturation loss of the controlling tissue governs. Whether or not to consider a fraction of a minute must be determined by inspection. This last step is necessary because tissue loss is rounded off to the nearest foot.

AD-609 325 Div. 16
OTS Prices: HC $3.00/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
DETERMINATION OF AEROBIC AND ANAEROBIC MICROFLORA OF HUMAN FECES.
Final rept. for Apr-Jul 64,
by Lorraine S. Gall and Phyllis Riely. Oct 64, 86p
RAC-2174-1
Contract AF33 615 1748, Proj. 7164, Task 716405
AMRL TR64 107
Unclassified report

Descriptors: (*Space biology, Nutrition), (*Astronauts, Diet), (*Diet, Excretion), (*Excretion, Microorganisms), Humans, Food, Frozen foods, Dehydrated foods, Culture media, Bacteria, Fungi, Microbiology, Culture media, Shigella, Escherichia coli.

The purpose of this study was the determination of the aerobic and anaerobic microflora of human feces and any effect, real or relative, of a space-type diet upon this flora. Fecal specimens from four young men confined in an experimental activity facility were cultured both aerobically and anaerobically thirteen times during a six-week period. During certain periods the men wore space suits. Two of the men were on an experimental space-type diet which was freeze-dehydrated. During this same time period the other two subjects were on a 'control' diet which contained identical foods, fresh and canned, in order to duplicate as nearly as possible the dehydrated diet from a nutritional viewpoint. Midway in the experiment the diets of the subjects were switched. The procedures used emphasized the anaerobic isolation of the predominating microorganisms using Gall's specialized technique. The aerobes were isolated and identified by standard procedures. An attempt was made to roughly quantitate the flora by the use of triplicate aerobic dilution series and by the plating from each dilution into differential media. Although the obligately anaerobic character of the flora remained constant, a shift was found in the types of anaerobic organisms isolated. This change in the biochemically distinct flora occurred after a sufficiently lengthy period on the diet to suggest that the diet was a contributing factory. (Author)

AD-609 390 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
AN EXPERIMENT IN MAINTAINING HOMEOSTASIS IN A LONG DISTANCE UNDERWATER SWIMMER.
Rept. no. 2,
by H. Hunt, E. Reeves, and E. L. Beckman. 23 Jul 64, 9p
Proj. MR005 13 4001 06
Unclassified report

Descriptors: (*Swimming, Underwater), (*Metabolism, Swimming), Physiology, Nutrition, Sodium, Potassium,

Urine, Blood analysis, Body weight, Body fluids, Exercise, Respiration, Medical examination.

A record-holding long distance underwater swimmer served as the subject for investigations of conditions of prolonged submersion and exercise. The studies were performed while the swimmer was attempting to swim 110 miles along the Eastern Coast of Florida within a period of approximately 48 hours. The purpose of this experiment was to measure and attempt to replace his metabolic loss. The air was supplied from a self-contained underwater breathing apparatus (SCUBA). His nutritional needs were supplied by the every one-half hour feeding of 125 ml. of a nutrient formula taken down to the swimmer in a nursing bottle. This replacement diet consisted of 18 percent protein, 72 percent carbohydrate and 10 percent fat. The rate of sodium and potassium administration was 4 and 9 mEq. per hour, respectively. The estimates of his caloric requirement were made on the basis of a series of swimming pool trials and found to be approximately 150 kilocalories at a swimming speed of 0.9 mph. The caloric consumption during the ocean swim was calculated from the subject's air usage rate to be 264-280 kilocalories per hour at a swimming speed estimated to be 1.0-1.2 mph. Becuase his caloric replacement was at the rate of 187 kilocalories per hour, the subject had a calculated caloric deficit of 77-93 kilocalories per hour. His weight loss, however, was limited to to 210 gm. Serum and urine changes which occurred during the ocean swim suggested a salt and water diuresis during submergence, followed by extreme water and salt conservation for at least 22 hours after the swim. (Author)

AD-609 412 Div. 16
OTS Prices: HC $7.00/MF $1.75

Northrop Space Labs., Hawthorne, Calif.
ANALYSIS AND BIODYNAMICS OF SELECTED ROCKET-SLED EXPERIMENTS. PART I. BIODYNAMICS OF MAXIMAL DECELERATIONS. PART II. DYNAMIC RESPONSE OF RESTRAINED SUBJECT DURING ABRUPT DECELERATION,
by J. P. Stapp, J. D. Mosely, C. F. Lombard, G. A. Nelson, and George Nichols. Jul 64, 329p
Contract AF41 609 2317

Unclassified report

Part 2 is a revised edition of NAI-54-585 published in 1954 as a result of contract between Northrop Aircraft Co., and Aeromedical Field Lab., Holloman AFB, N. Mex. Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Acceleration tolerance, Space medicine), (*Deceleration, Tolerances (Physiology)), (*Stress (Physiology), Rocket-propelled sleds), Adaptation (Physiology), Chimpanzees, Survival, Dynamics, Statics.

Part I presents the methods and procedures used to expose adult anesthetized chimpanzee subjects to high levels of deceleration during 23 experiments on the rocket-sled. Deceleration was accomplished by programmed water inertia braking where trapezoidal patterns were produced. Part II presents the results of a study made to determine the relationship of the many variables involved when a restrained subject is exposed to an abrupt deceleration by the application of a basic forcing function to the supporting vehicle. The studies include the response of the restraints under both static and dynamic loads.

AD-609 414 Div. 16
OTS Prices: HC $1.00/MF $0.50

Colorado State Univ., Fort Collins. Research Foundation.
A STUDY OF PITUITARY, THYROID AND ADRENAL GLAND RELATIONSHIPS IN GROUND SQUIRRELS (CITELLUS RICHARDSONI) AS INFLUENCED BY DIET AND ATMOSPHERIC PRESSURE.
Final rept.,
by R. R. Lechleitner. 10 Dec 64, 24p
Contract Nonr161007, Proj. NR102 510

Unclassified report

Descriptors: (*Endocrine glands, Rodents), (*Rodents, Endocrine glands), Pituitary gland, Thyroid gland, Adrenal glands, Adrenocorticotropic hormones, Thyroid hormones, Adaptation (Physiology), Barometric pressure, Hibernation Body weight, Nutrition, Food, Diet, Wyoming.

The objectives of the research were (a) to study the dietary changes occurring in ground squirrels prior to their entrance into hibernation; (b) to determine if a correlation exists between dietary changes and functional activity of the pituitary, thyroid and adrenal cortex, and (c) to study the time relationship of changes in functional activity of these glands. The work accomplished under this contract involved three phases and the results are presented separately for each phase. Phase One consisted of a field investigation of the squirrels under natural conditions near Tie Siding, Wyoming. Phase Two consisted of laboratory studies of circulating pituitary (ACTH, TSH) and thyroid hormones. Phase Three consisted of a laboratory experiment designed to test the efficacy of various diets upon activity patterns, weight gains, endocrine activity, and the hibernating ability of the squirrels.

17. Metallurgy

AD-608 940 Div. 17, 31
OTS Prices: HC $1.50/MF $0.75

Naval Research Lab., Washington, D. C.
METALLURGICAL CHARACTERISTICS OF HIGH STRENGTH STRUCTURAL MATERIALS.
Quarterly rept. no. 5, May-Aug 64,
by T. W. Crooker, R. E. Morey, E. A. Lange, R. W. Judy, and C. N. Freed. Sep 64, 60p
Projs. SR007 01 01 0850, SR007 01 02 0704
NRL 6196

Unclassified report

See also AD-602 412.

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Submarine hulls), (*Titanium alloys, Submarine hulls), (*Aluminum alloys, Submarine hulls), Hulls (Marine), Heat treatment, Maraging steels, Fracture (Mechanics), Rolling (Metallurgy), Toughness, Nickel alloys, Chromium alloys, Molybdenum alloys, Tin alloys, Tantalum alloys, Mechanical properties, Corrosion, Tensile properties, Stresses, Welding, Diffusion bonding, Fatigue (Mechanics), Niobium alloys, Vanadium alloys.

A progress report covering research studies in high strength hull structural materials, conducted in the period May 1964 to August 1964, is presented. These studies include the development of preliminary relationships of flaw size and stress for fracture of quenched and tempered steels, maraging steels, titanium, and aluminum. Preliminary information has also been developed in the relationship between the notch tensile test and the drop-weight tear test for aluminum alloys. The effects of corrosion environments on the crack rate propagation in HY-80 to HY-150 quenched and tempered steels have been examined under low cycle fatigue conditions. Preliminary results on a study of the directionality effects due to cross-rolling on the fracture toughness of quenched and tempered steels are presented. The fracture toughness properties of specially processed Ti-7Al-2Cb-1Ta, diffusion-bonded Ti-6Al-4V, forged Ti-5Al-2.5Sn, and titanium weldments are reported. (Author)

AD-608 991 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
CALORIMETRY OF TRANSIENT PHENOMENA IN METALS AT LOW TEMPERATURES,
by Joachim C. Erdmann and James A. Jahoda. Oct 64, 47p D1-82-0384

Unclassified report

Also available from the author.

Descriptors: (*Cryogenics, Alloys), (*Alloys, Cryogenics), (*Metals, Cryogenics), Metals, Copper alloys, Nickel alloys, Lead alloys, Indium alloys, Calorimeters, Deformation, Crystal lattice defects, Thermal properties, Solid solutions, Heat transfer, Transport properties.

A method is described which has been applied to measure the thermal energy leaving a metal specimen at low temperatures under the following conditions of thermal excitation: 1) Generation of localized instantaneous heat sources associated with discontinuous slip during tensile deformation of copper-nickel alloy specimens at 4.2K. 2) Uniform heating of copper-nickel and lead-indium alloy specimens at time-dependent rates due to pre-plastic and plastic tensile deformation at 4.2K. The method is based on the observation of thermal transients associated with the heat release. The inertia of the thermometers is either eliminated or accounted for. The results obtained permit a discussion of (a) the stored energy of plastic deformation of metals, (b) the energy dissipated by the bowing and breakaway of dislocations pinned by solute atoms in solid solutions. (Author)

AD-609 000 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif.
DISLOCATION STRUCTURES IN DEFORMED AND RECOVERED TANTALUM.
Technical rept. no. 11,
by T. W. Barbee, Jr. and R. A. Huggins.
Nov 64, 27p DMS-64-25
Contract Nonr22534, Proj. NR031 577

Unclassified report

Descriptors: (*Metallography, Tantalum), (*Tantalum, Crystal lattice defects), (*Crystal lattice defects, Tantalum), Deformation, Electron microscopy, Strain (Mechanics), Temperature, Foils, Grain boundaries, Grain structure (Metallurgy).

Dislocation structures in deformed tantalum were examined using transmission electron microscopy. It was found that the deformation structures formed in tantalum strained at temperatures between 25 and 1000C are comparable to those found in iron on the basis of homologous deformation temperatures. Several observations pertaining to the distribution of tangles at low strains, the types of tangles formed, the mechanisms of tangle formation, and the formation of deformation cell structure from tangles are also reported. (Author)

AD-609 063 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Martin Marietta Corp., Orlando, Fla.
EXPERIMENTAL AND THEORETICAL ASPECTS OF LIQUID METAL EMBRITTLEMENT,
by Henry M. Otte and Agerico L. Esquivel. Dec 64, 34p OR-6317
Contract DA36 034AMC0205R, Proj. AJ4A0439 01AJAD

Unclassified report

Descriptors: (*Failure (Mechanics), Metals), (*Alloys, Brittleness), (*Brittleness, Liquid metals), Stresses, Crystal lattice defects, Aluminum alloys, Copper alloys, Brass, Zinc alloys, Mercury, Aging (Materials), Electron microscopy, Heat treatment, Surface-active substances, Grain boundaries, X-ray diffraction analysis, Aluminum, Zinc, Solids, Fracture (Mechanics), Tensile properties, Elasticity, Atomic properties.

The report describes the investigation of the premature failure of a solid metal wetted with a liquid metal and stressed below or slightly above its normal yield point. Conclusions are: (1) Prospensity to embrittlement by a liquid metal can be heightened by increasing the density of stress concentration regions in the host metal; (2) Grain boundaries probably play a secondary role in liquid metal embrittlement; (3) Stacking faults and dislocation networks render the material more susceptible to embrittlement; and (4) Liquid metal atoms may affect the lattice parameters of the host metal. (Author)

AD-609 103 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

United Aircraft Corp., East Hartford, Conn.

INVESTIGATION OF FRACTURE MECHANISMS THERMAL STABILITY AND HOT-STRENGTH PROPERTIES OF CONTROLLED POLYPHASE ALLOYS.
Quarterly progress rept. no. 2, 13 Jun 12 Sep 64,
by James A. Ford, Byron J. Bayles, and Frederick D. George. 9 Oct 64, 22p C-910239-2
Contract NOw64 0433d

Unclassified report

Descriptors: (*Alloys, Phase studies), (*Fracture (Mechanics), Alloys), Eutectics, Microstructure, Grain structures (Metallurgy), Aluminum alloys, Copper alloys, Nickel alloys, Tensile properties, Metallography, Heat treatment, Crystallography.

The results of continued investigations concerning the effect of phase particle size on tensile strength, the thermal stability and the hot tensile strength of unidirectionally solidified Al-CuA12 and Al-A13Ni eutectic alloys are reported in this quarterly report. Production of sufficient ingots for all studies at three solidification rates has been completed using a semi-automatic temperature controller in conjunction with a water-cooled crucible end plug. Thermal stability studies of an Al-CuA12 ingot produced at a 2.2 cm/hr solidification rate have shown that 500 hr of annealing at 537C are insufficient to cause breakdown of the lamellar structure at other than mismatch regions. Furthermore, there has been no measurable change in lamellar spacing or crystallography. However, there has been an increase in the number of terminations, termed faults, due to the breakdown of individual plates at defects in their surface. The first set of heat treatments on an Al-A13Ni specimen solidified at 2.2 cm/hr through 100 hr at 555C have been completed and post-heat treatment studies are under way. (Author)

AD-609 157 Div. 17, 26
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SEAM WELDING OF MA8 ALLOY WITH HERMETICALLY SEALED SEAMS,
by A. A. Chakalev, V. I. Zaitsev, and G. F. Skakun.
7 Nov 64, 12p
FTD TT64 1187; TT 65 60457

Unclassified report

Unedited rough draft trans. of Svarochnoe Proizvodstvo (USSR) 1964, no. 6, p. 16-19.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnesium alloys, Welding), (*Welds, Magnesium alloys), USSR, Sheets, Metal joints, Fracture (Mechanics), Corrosion inhibition, Density, Manufacturing methods, Geometric forms, Electrodes.

During roller welding of magnesium alloys it is necessary to avoid overheating of sheet surface, leading to the formation of cracks, reduction in corrosion resistance and disruption of seam hermeticity. To obtain extended joints, possessing high density, use double row seams; when selecting the welding system consideration must be given to the geometric characteristics of the item. Electrodes with intensive internal water cooling are employed. (Author)

AD-609 188 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Hammond Metallurgical Lab., Yale Univ., New Haven, Conn.
DETERMINATION OF STACKING FAULT PROBABILITIES AND INTERNAL STRAINS FROM LATTICE PARAMETER AND LINE PROFILE MEASUREMENTS OF COLD WORKED a-Cu-Zn AND a-Cu-Sn FILINGS.
Technical rept. no. 8,
by C. N. J. Wagner and J. C. Helion. May 64, 37p
Contract Nonr60943

Unclassified report

Master's thesis.
Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Crystal lattice defects, Copper alloys), (*Copper alloys, Crystal lattice defects), (*Tin alloys, Crystal lattice defects), (*Zinc alloys, Crystal lattice defects), Metallic crystals, Crystal lattices, Probability, Cold working, Strain (Mechanics), Powder metals, X-ray diffraction analysis, Center of gravity, Solid solutions, Crystallography.

Copper-zinc and copper-tin terminal solutions were cold worked by making filings at room temperature. The plots of the lattice parameter calculated from the peak position of the individual reflections as a function of costheta cottheta proved to be linear for all annealed powder samples. The large scatter of the individual a sub hkl values of the cold worked filings could be related to the occurrence of deformation stacking faults, segregation and internal stresses, and the true lattice parameters. The lattice parameter of the Cu-Zn alloys is larger whereas that of the Cu-Sn alloys is smaller than the corresponding values. Tne deformation fault probability a increases with increasing solute concentration. The combined twin fault probabilities and extrinsic fault probability were determined from the displacements of the center of gravity from the peak maximum positions of the (111) and (200) reflections.

AD-609 189 Div. 17, 26
OTS Prices: HC $2.00/MF $0.50

Hammond Metallurgical Lab., Yale Univ., New Haven, Conn.
X-RAY DIFFRACTION STUDY OF PLASTICALLY DEFORMED COPPER.
Technical rept. no. 12,
by C. N. J. Wagner, J. P. Boisseau, and E. N. Aqua.
Sep 64, 26p
Contract Nonr60943

Unclassified report

Descriptors: (*Copper, Crystal lattice defects), (*Powder metallurgy, Copper), Metallic crystals, Crystal structure, Microstructure, X-ray diffraction analysis, Particle size, Deformations, Crystal lattice defects, Creep, Powder metallurgy, Mechanical working, Metallography.

The purpose of the present investigations was to perform a detailed x-ray analysis on a bulk specimen of a fcc metal deformed by rolling at room temperature and on powder of the same material deformed by compaction, and to compare these results with those previously obtained on cold worked filings. Pure copper was chosen for this study since it is known to produce only a small quantity of stacking faults by filing at room temperature. The residual elastic strain in the surface of the bulk-copper should be the predominant factor determining the shifts of the powder pattern peaks from the bulk specimens, whereas residual stresses should be absent or small in the compacted copper powders.

AD-609 228 Div. 17, 13, 31
OTS Prices: HC $0.75/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.

IMPROVED METHOD OF DETERMINING METAL CORROSION RATE BY WEIGHT LOSS.
Rept. for May-Aug 63,
by E. S. Matsui. 16 Nov 64, 19p
Proj. Y R007 08
NCEL R341

Unclassified report

Descriptors: (*Salt spray tests, Panels (Structural)), (*Steel, Corrosion), (*Corrosion, Salt spray tests), Weight, Reduction, Corrosion inhibition, Specifications, Panels (Structural), Drydock equipment, Ballast tanks, Protective treatments.

A deficiency was found in the procedure for the salt-spray test given in MIL-C-23050(Ships), which is used to determine the weight loss suffered by metal structures, such as ballast tanks, from rusting. The procedure did not take into account the nonhomogeneity of material among the panels being tested. A modified method was developed, and the results obtained with this method were compared with those obtained using the original method. The modified method not only corrected the deficiency, but it also improved the precision of the test method significantly. (Author)

AD-609 237 Div. 17, 30
OTS Prices: HC $2.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
INDENTER METHOD FOR DETERMINING LOCKED IN TENSILE STRESS.
Technical note,
by Rolland G. Sturm. Nov 64, 38p BrownEng-R-123

Unclassified report

Descriptors: (*Non-destructive testing, Stresses), (*Tensile properties, Metals), (*Test methods, Tensile properties), Shear stresses, Surface properties, Photographs, Loading (Mechanics), Fatigue (Mechanics), Life expectancy, Rolling (Metallurgy), Steel, Welds, Equations.

A simple, quick, and feasible method of detecting the presence of locked in stresses in members with limited access is presented. The test consists of making an indentation in the metal surface and photographing the indentation at close range. Dimensions of the indentation reveal the locked in stress when loads are not applied or the total stress upon application of load. Actual observations on the hold down arms for SATURN S-IC are given as an illustration. (Author)

AD-609 243 Div. 17
OTS Prices: HC $3.00/MF $0.75

Watervliet Arsenal, N. Y.
STRESS-AGING: A NEW TREATMENT FOR ALLOYS, PART TWO: EFFECT ON STANDARD TENSILE PROPERTIES OF 4330 TYPE STEEL.
Technical rept.,
by R. H. Harrington. Sep 64, 58p
Proj. 1A0 24401A1'0 06
WVT rr6424

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Aging (Materials), Loading (Mechanics), (*Steel, Tensile properties), (*Alloys, Aging (Materials), Elasticity, Stresses, Ductility, Heat treatment, Metallography, Mechanical working, Deformation, Material forming.

Stress-aging is a new treatment for alloys that results in improved strength properties with little, or no, loss in ductility. Specific treatments result in (a) maximum proportional limit or elastic capacity, (b) maximum 0.1% offset yield strength or (c) best generally high properties. The proportional limit may be increased by 65,000 psi (above the initial tensile strength), the 0.1% offset yield strength may be increased by 30,000 psi, with elongation ranging from 8% to 14%, while reduction of area remains essentially constant (50-54%). Stress-aging raises 4330 steel into the lower range of ultra-high-strength steels. (Author)

AD-609 250 Div. 17, 25
OTS Prices: HC $6.00/MF $1.25

Stanford Univ., Calif.
THE INFLUENCE OF GRAIN BOUNDARIES AND STACKING FAULTS ON HIGH TEMPERATURE PLASTIC DEFORMATION.
Technical rept. no. 3,
by Craig Radford Barrett. 1 Oct 64, 213p DMS-64-22
Contract Nonr22560, Proj. NR031 682

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.
See also AD-410 520.

Descriptors: (*Grain boundaries, Creep), (*Crystal lattice defects, Creep), (*Creep, Grain structures (Metallurgy)), High-temperature research, Deformation, Heat treatment, Particle size, Copper, Iron alloys, Silicon alloys, Recrystallization, Crystal structure.

Data are presented on the influence of grain boundaries and stacking faults on high temperature plastic deformation. Three specific areas were investigated: (1) the influence of grain size and annealing treatment on the primary and steady state creep characteristics of high purity copper, (2) the influence of stacking fault energy on primary and steady state creep and (3) the influence of grain size on the dislocation substructure generated during creep of an Fe - 3.0% Si alloy.

AD-609 293 Div. 17, 14
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
IMPROVED METALLOGRAPHY FOR TiC AND TiC-C ALLOYS,
by E. G. Kendall, J. H. Richardson, and C. Hays.
30 Oct 64, 18p TDR-269(4240-10)-16
Contract AF04 695 269
SSD TDR64 251

Unclassified report

Prepared in cooperation with National Aeronautics and Space Administration, Huntsville, Ala.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Titanium compounds, Carbides), (*Carbides, Titanium compounds), (*Microstruture, Color photography), (*Carbon alloys, Carbides), Metallography, Eutectics, Photomicrography, Processing, Oxidation, Films.

A new metallographic method for improved microscopy of TiC and alloys of TiC-C is described. The complete processing recommendations for sectioning, grinding, intermediate and final polishing, as well as anodization to produce definitive microstructures in color are included along with some photographic suggestions. (Author)

AD-609 338 Div. 17, 14
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.

NOTES FROM AN OPEN SESSION OF THE SUB-COMMITTEE ON MICROSTRUCTURE AND FRACTOGRAPHY.
Technical note.
5 May 64, 7p

Unclassified report

Session held at the Naval Research Lab., Washington, D. C., 10 Mar 64.

Descriptors: (*Fractography, Alloys), (*Alloys, Fracture (Mechanics)), Stainless steel, Corrosion, Stresses, Austenite, Eutectics, Copper alloys, Chromium alloys, Aluminum alloys, Nickel alloys, Epoxy plastics, Tensile properties, Microstructure.

AD-609 339 Div. 17, 13
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
PERMEABILITY OF TITANIUM TO HYDROGEN.
Technical note,
by James D. Jackson. 29 Jul 64, 3p

Unclassified report

Descriptors: (*Liquified gases, Containers), (*Titanium, Permeability), (*Hydrogen, Diffusion), (*Storage tanks, Titanium), Time, Pressure, Temperature, Titanium alloys.

While titanium has proved to be a good material for containers for liquid hydrogen, calculations of the rates of diffusion of hydrogen through titanium indicate that there may be practical limits of temperature, pressure, and time that must be recognized in designing containers for hydrogen. These calculations are presented. On the basis of the reported data, it is not believed that titanium and its alloys can be recommended as a container material for hydrogen for long-term service much above 200 F. For short-term service, the permeation to hydrogen ay be low up to temperatures near 500 F and at low pressures.

AD-609 343 Div. 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
LOW-TEMPERATURE CREEP CHARACTERISTICS OF Ti-5Al-2.5Sn AND Ti-6Al-4V ALLOYS.
Technical note,
by John A. VanEcho. 8 Jun 64, 7p

Unclassified report

Descriptors: (*Titanium alloys, Creep), (*Creep, Titanium alloys), Low-temperature research, Heat treatment, Tensile properties, Stresses, Strain (Mechanics), Experimental data, Aluminum alloys, Tin alloys, Vanadium alloys.

AD-609 353 Div. 17, 26
OTS Prices: HC $3.00/MF $0.75

Defense Metals Information Center, Columbus, Ohio.
EFFECTS OF STRUCTURE ON THE PROPERTIES OF Ti-5Al-2.5Sn AND Ti-6Al-4V ALLOYS,
by R. A. Wood, D. J. Maykuth, and H. R. Ogden.
20 May 64, 65p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Titanium alloys, Metallography), (*Microstructure, Titanium alloys), Mechanical properties, Aluminum alloys, Tin alloys, Vanadium alloys, Grain structures (Metallurgy), Tensile properties, Creep, Stresses, Rupture, Toughness, Fatigue (Mechanics), Heat treatment, Welds, Impurities, Fracture (Mechanics).

These data represent the effect of certain specific fabrication schedules and heat treatments on the properties of these alloys. (Author)

AD-609 355 Div. 17, 1, 30
OTS Prices: HC $1.00/MF $0.50

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
INVESTIGATION INTO THE ELECTRICAL CONDUCTIVITY AND MECHANICAL PROPERTIES OF ALUMINUM ALLOYS SUBJECTED TO ELEVATED TEMPERATURE EXPOSURE,
by William Allen and Robert G. Mahorter.
30 Nov 64, 23p
NAEC-AML 2083

Unclassified report

Descriptors: (*Aluminum alloys, Test methods), (*Airframes, Degradation), Heat, Electrical conductance, Mechanical properties, Tensile properties, Measuring devices (Electrical and Electronic), Tests, Experimental data.

The relationship between the electrical conductivity (as measured by Magnatester Conductivity Meter, F100 Series) and strength properties of bare aluminum alloys 7075-T6, 7075-T73, 6061-T6, 7178-T6, 7002-T6, 2024-T81, 2024-T3, 7079-T6, 2020-T6, and 2219-T81 was investigated in an attempt to correlate conductivity with heat damage to aircraft structural alloys. (Author)

AD-609 399 Div. 17, 25, 4
OTS Prices: HC $1.00/MF $0.50

Catholic Univ. of America, Washington, D. C.
THE ELECTROCHEMICAL PROPERTIES OF METAL-HYDROGEN ALLOYS.
Final rept.,
by Gilbert W. Castellan. 4 Jan 63, 10p
Contract AF49 638 475
AFOSR 4561

Unclassified report

Descriptors: (*Alloys, Hydrogen), (*Palladium alloys, Hydrogen), (*Hydrogen, Palladium alloys), Diffusion, Silver alloys, Platinum, Foils, Electrochemistry, Transport properties, Gases, Electrodes, Water, Membranes, Electric currents.

An investigation was made to examine the rate of transmission of hydrogen through metals, both exothermic and endothermic hydrogen occluders, and from this examination to elucidate the mechanism of the process. In the case of palladium it is shown that, on an anodically activated surface in aqueous solution, the transmission is almost exclusively controlled by the diffusion through the bulk metal. However, the jump of a hydrogen atom from the metal surface to the interior of the metal is the next slowest step in the process. Using another method work was done with alloys of palladium and silver, 20% and 30% silver by weight. The results obtained with these alloys does not appear to agree with the observations of other investigators and this work will have to be extended and rechecked.

18. Military Sciences and Operations

AD-609 071 Div. 18, 23, 24, 28
OTS Prices: HC $3.00/MF $0.75

Rome Air Development Center, Griffiss AFB, N. Y.
PHOTOINTERPRETER PERFORMANCE STUDIES.
Summary rept. for 1962-1964,
by Shelton MacLeod. Sep 64, 54p
Proj. 6244, Task 624409
RADC TDR64 326

Unclassified report

Descriptors: (*Photointerpreters, Performance (Human)), (*Aerial reconnaissance, Photointerpretation), (*Human engineering, Photointerpretation), (*Photographic intelligence, Military training), Photographic images, Photographic projectors, Identification, Targets, Target recognition, Viewing screens, Time studies, Display systems, Training.

A summary of five studies sponsored by Rome Air Development Center is presented. These studies were designed to explore important relationships between measures of photointerpreter performance and the following types of antecedent factors: (1) Image quality: (2) Mode of presenting comparative-cover photography; (3) Techniques for rapid recognition training; (4) Temporal aspects (viewing time and work/rest cycles) of image presentation; and (5) Image content parameters. Each study is reviewed with respect to experimental objectives, approaches, results and conclusions. Immediate applications of the data and implications for future research are also discussed. (Author)

AD-609 200 Div. 18, 23
OTS Prices: HC $4.00/MF $1.00

Signal Corps Logistics Evaluation Committee, Philadelphia, Pa.
SIGNAL CORPS CONTRACT FIELD TECHNICIAN PROGRAM,
Final rept.
Nov 57, 124p SC-Log-Gp-57-119

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Research program administration), (*Army equipment, Maintenance), (*Maintenance personnel, Army equipment), Army operations, Personnel management, Technicians, Army personnel, Recruiting, Government employees, Army training, Costs, Army procurement, Military requirements, Wages, Army budgets.

The object of the research was to review the Signal Corps Contract Field Technician Program to determine whether optimum benefit to the Government and incentive to industry are being achieved. It is assumed that (1) the Army will continue having difficulty in maintaining and operating its equipment entirely through the use of Army personnel as long as the present national policies for military and civil service recruitment and tenure of service prevail; and (2) the constant development and continued issue of improved and increasingly complex equipment will require continuing use of contract field technicians to complement and develop the maintenance capability of military and civil service personnel. It is recommended that the administration of the Program be transferred to USASESA; the procurement function be performed by LPO; the invoice processing and payment be accomplished by the Fiscal and Finance Officer, Fort Monmouth, New Jersey; descriptions of requirements be improved; close coordination between the field activities and the administering agency be maintained; better utilization of technicians be accomplished; contractual provisions be revised to increase the capability of the Program to the fullest extent possible; and a pool of contract field technicians be established at USASESA.

AD-609 232 Div. 18, 30
OTS Prices: HC $6.00/MF $1.25

Signal Corps Logistics Evaluation Committee, Philadelphia, Pa.
SYSTEM ANALYSIS AUTOMATIC DATA PROCESSING APPLICATION REQUISITIONING, ITEM ACCOUNTING AND REPORTING, CLASS II AND IV SUPPLY,
by Michael J. Mrakava and Grady H. Banister.
Dec 58, 231p SC-Log-Gp-58-137

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Data processing systems), (*Inventory control, Data processing systems), (*Data processing systems, Logistics), Army procurement, Inventory control, Automatic, Systems engineering, Operations research, Optimization, Distribution.

The intent of this study is: first, to delineate in detail present operations by means of flow and functional charts and estimated workload data; second, to develop and present by means of flow and functional charts, an improved system, based on the present operation, with appropriate recommendations for the changes necessary to accomplish the improvements; third, to develop and present in detail, including schematic flow charts and estimated workload data, a proposed system for performing the improved operation by means of an Automatic Data Processing System (ADPS). Development of an improved system has been given emphasis in order to provide an optimum operation upon which to base the flow and workload diagrams leading to the introduction of automatic data processing into the Field Army structure.

AD-609 233 Div. 18
OTS Prices: HC $4.00/MF $0.75

Signal Corps Logistics Evaluation Committee, Philadelphia, Pa.
FEASIBILITY OF MOBILE SIGNAL CORPS DEPOT. PHASE I, MOBILE SIGNAL CORPS REPAIR PARTS DEPOT,
by William J. Lingan, Bernard Pear, and Jack N. Nahas.
Dec 57, 109p SC-Log-Gp-57-110-I

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Research program administration), (*Supply depots, Mobile), (*Armed forces supplies, Spare parts), (*Stock level control, Logistics), Maintenance, Transportation, Storage, Distribution, Cargo ships, Cargo vehicles, Transport planes, Trailers, Railroads, Army personnel, Military requirements, Feasibility studies.

An attempt is made to define the characteristics of a universally mobile repair parts issue point suitable for supporting division size field units. It is assumed that (a) 'Universal Mobility' is characterized by ease of movement by highway, rail, water, and air; (b) For uniformity with respect to terms of reference, the

words 'issue point' include related installations with generally similar functions, including the Direct Support Unit (DSU), supply points and depots; (c) Concepts for future warfare demand that logistics support activities in a combat zone have mobility equal to the tactical mobility of the supported units; (d) Trends and changes in present Army organizational structure demand ever-increasing mobility; (e) Conventional port facilities will be used to a limited degree because such logistics concentrations would provide the enemy highly desirable atomic weapons targets.

AD-609 239 Div. 18, 5
OTS Prices: HC $2.00/MF $0.50

Signal Corps Logistics Evaluation Committee, Philadelphia, Pa.
ACCELERATION OF LOGISTICS DATA IN CONUS.
Aug 60, 29p SC-Log-Gp-60-147

Unclassified report

Descriptors: (*Logistics, Data transmission systems), (*Data transmission systems, Logistics), (*Communication systems, Logistics), United States, Army, Acceleration.

Background concepts are presented for a communication system that will lead to accelerated transmission of Signal Corps logistics data in CONUS. Requirements for fast yet economical data transmission service for Signal logistics activities in CONUS are increasing. The optimum capability of the Army Switched Data Network cannot be utilized as presently employed by Signal supply elements in CONUS. Increased automation of Signal supply operations in CONUS is creating a need for new and revolutionary data transmission equipment and techniques. Standardized methods, procedures,and facilities must be adopted to provide efficient data transmission service for Signal logistics activities in CONUS. Neither a philosophy nor sufficient principles and policies covering data transmission service have been established and disseminated to guide both the communicators and the logisticians in the development of an integrated data transmission system.

AD-609 280 Div. 18, 30
OTS Prices: HC $6.00/MF $1.25

American Power Jet Co., Ridgefield, N. J.
COMPUTER PREDICTION OF ENVIRONMENTAL EFFECTS ON USAF MATERIEL,
by George Chernowitz, Samuel J. Bailey, and Sol Gurman. Oct 64, 227p
Contract AF33 657 8736, Proj. 1309, Task 130903
FDL TDR64 107

Unclassified report

Descriptors: (*Logistics, Environmental tests), (*Air force equipment, Reliability), (*Mathematical models, Environmental tests), Programming (Computers), Computer logic, Information retrieval, Digital computers, Set theory, Search theory, Operations research, Mathematical prediction.

This report presents a systematized method for determining and predicting the effects of environments on USAF materiel. It covers the theory and use of computer techniques which will enable environmental test engineers to obtain information on the probable effects of various environmental elements, the required tests to insure environmental reliability, the hazardous combinations of materials and environments, the location and availability of test facilities, and similar environment-equipment relationship data. The system recommended is designed as an environment-oriented center which will be expanded and made increasingly useful by the addition of service modules. Each module improves the sophistication of the system by modifying queries for optimum response, by seeking environmental data from users of the service, by analyzing failure distribution data to provide equipment-environment failure data matrices, indicating hazardous combinations of materials for exotic environments, and by providing similar advanced and self-improving services as the need for such services becomes known. (Author)

AD-609 366 Div. 18, 1, 33
OTS Prices: HC $3.00/MF $0.75

Tactical Air Command, Langley AFB, Va.
OPERATIONAL TEST AND EVALUATION OF C-119, ALAMO SLING SHOT AERIAL DELIVERY SYSTEM.
Dec 64, 84p
TAC TR64 60

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Air drop operations, Positioning devices (Machinery)), (*Positioning devices (Machinery), Air drop operations), Transport planes, Aircraft equipment, Handling, Release mechanisms, Cargo, Parachute descents, Containers, Air force operations, Air force training, Logistics, Feasibility studies, Air transportation.

The objective of this operational test was to evaluate the capability, suitability, and training requirements of the 'Alamo Sling-Shot System' for aerial delivery from C-119 aircraft. It was determined that C-119 air-drop capability was greatly improved by use of the 'Alamo Sling-Shot System,' due to a vast improvement in airdrop accuracy, reliability, ease of loading, rigging, versatility, and minimum aircrew training required to obtain proficiency. It is recommended that the 'Alamo Sling-Shot System' be approved for operational use in airdropping A-22 containers and other similar loads for which rigging procedures have been established. (Author)

AD-609 376 Div. 18, 3, 5, 13
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Fullerton, Calif.
COLLECTIVE PROTECTION EQUIPMENT FOR THE AN/MSG-4 SYSTEM. FEASIBILITY STUDIES AND EQUIPMENT DEVELOPMENT.
Bi-monthly rept. no. 2, 1 Oct-30 Nov 64,
by L. W. Maples. 10 Dec 64, 11p HAC-FR-64-11-342
Contract DA18 035AMC305A

Unclassified report

Descriptors: (*Shelters, Radio stations), (*Chemical warfare, Shelters), (*Biological warfare, Shelters), Contamination, Air conditioning equipment, Decontamination, Air-intake filters, Cooling and ventilation equipment, Heating, Biological contamination, Chemical contamination, Pressure, Temperature, Cooling, Radar stations.

During this reporting period, effort was devoted primarily to the following items of work: Continued study of AN/MRC-69 and AN/MRC-73 system characteristics, and preparation of data and CPE system conceptual design approaches for the final study report which will include HAC recommendations for Collective Protection of these electronic systems. Engineering design of new equipment required for the RTS Collective Protection System. Air leakage tests of the RTS shelter with two models of air conditioners. Study of the AN/GSM-44 to determine

internal temperature conditions which will exist at winter and summer ambient conditions if air conditioning is not utilized and internal heat dissipation is accomplished by a high capacity filter unit.

AD-609 393 Div. 18, 31
OTS Prices: HC $3.00/MF $0.75

George Washington Univ., Washington, D. C.
THE METHODOLOGY FOR IMPROVED INSPECTION PROCEDURES BY THE U. S. NAVY BOARD OF INSPECTION AND SURVEY.
Scientific rept.,
by Frank W. Segel. 11 Dec 64, 67p T-160
Contracts Nonr 76103, Nonr76105,
Projs. NR345 107, NR047 001
Unclassified report

Rept. on Logistics Research Proj.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from the best available copy.

Descriptors: (*Naval vessels (Combatant), Military requirements), (*Fleets, Military requirements), Navy, Naval operations, Navy budgets, Deployment, Maintenance, Scheduling, Measurement, Quality control, Logistics.

The Office of the Chief of Naval Operations (OPNAV) has shown considerable interest in the need for measurement of material readiness of the fleet or any of its segments. OPNAV presented the problem of measuring material readiness-for-war of ships comprising the fleet. Similar objectives regarding material readiness account for the merging of research interests by the U. S. Navy Board of Inspection and Survey (INSURV) and the Project. The interest, expressed by INSURV, in establishing a uniform, analytical inspection methodology which permits the aggregation of inspection ratings pertaining to the material readiness-for- war provided the Project with the opportunity to apply its interests in the area of military worth utility measures and in methodology for determining an index to reflect material readiness. This paper presents the initial results of this merging of interests by INSURV and the Project. (Author)

AD-609 406 Div. 18, 3, 13
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Fullerton, Calif.
ANALYSIS OF COOLING-HEATING-COLLECTIVE PROTECTION FOR AN/GSM-44 SYSTEM, APPENDIX A,
Dec 64, 54p HAC-FR-64-11-342
Contract DA18 035AMC305A
Unclassified report

Descriptors: (*Shelters, Maintenance equipment), (*Chemical warfare, Shelters), (*Biological warfare, Shelters), Air-intake filters, Decontamination, Biological contamination, Chemical contamination, Cooling and ventilation equipment, Heating, Cooling, Temperature, Contamination, Air conditioning equipment.

An analysis was made to show the internal temperature conditions which will exist in the AN/GSM-44 Shelter when Collective Protection Equipment is used with different types and capacities of CB Filter Units, and to present various possible approaches, with comments and recommendations, for adapting CPE to the AN/GSM-44 System.

19. Navigation

AD-608 952 Div. 19, 1, 33
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
DYNAMIC SIMULATION STUDIES OF PICTORIAL NAVIGATION DISPLAYS AS AIDS TO AIR TRAFFIC CONTROL IN A LOW-DENSITY TERMINAL AREA AND IN AN EN ROUTE AREA.
Final rept.,
by A. L. Sluka. Feb 63, 74p
Proj. 115 703X
N63 17438

Unclassified report

Descriptors: (*Ground position indicators, Display systems), (*Display systems, Flight instruments), (*Navigational aids, Display systems), (*Air traffic control systems, Display systems), Dynamics, Simulation, Air traffic control terminal areas, Instrument flight, Navigation computers, Air traffic, Flight paths, Radar navigation, Effectiveness, Systems engineering.

This report describes an ATC dynamic simulation study that was conducted to determine the operational value of cockpit pictorial displays, course line computers, and pictorial computers as aids to air traffic control in a low-density terminal area and in an en route area. The Salt Lake City terminal area was used for the low-density study, while the en route structure from Miami to New York was selected as the en route area of investigation. In the en route studies, particular emphasis was placed on the route structures centered around Miami, Jacksonville, and New York. The study showed that pictorial display routes, procedures and techniques can be systematically integrated with the existing system, and generally meshed smoothly with simultaneous use of radar techniques. Improvements were related to a simplification of the control functions as indicated by reduction in controller workload and an increased ability to manipulate traffic. This modified the control function from that of radar navigation to the less demanding function of radar monitoring. (Author)

AD-608 966 Div. 19, 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME ASPECTS OF ASTRONAUTICS,
by R. W. Buchheim, S. Herrick, E. H. Vestine, and A. G. Wilson. 23 Jul 58, 49p P-1442

Unclassified report

Submitted for publication in the IRE Transactions on Military electronics.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Space navigation, Astronautics), (*Astronautics, Space flight), Satellites (Artificial), Spacecraft, Perturbation theory, Lunar trajectories, Interplanetary trajectories, Orbital trajectories.

The aspects of celestial mechanics and their influence on space navigation are considered. The total action of forces and relative motions and distances as they affect an object traveling in space are discussed. The main categories of space flight covered are earth satellites, lunar flights, and interplanetary flights.

AD-609 048 Div. 19, 28
OTS Prices: HC $2.00/MF $0.50

Dunlap and Associates, Inc., Darien, Conn.
HUMAN FACTORS STUDY OF THE USN MARK II HANDHELD SEXTANT.
Final rept.
Nov 64, 30p DRD-64-133
Contract N140 62462 76732B

Unclassified report

Descriptors: (*Sextants, Design), (*Human engineering, Sextants), Celestial navigation, Performance (Human), Stability, Illumination, Calibration, Weight, Naval equipment.

A technical summary is presented of the research conducted and the design recommendations resulting from a human factors study of the Navy's handheld sextant. Recommendations for further research are presented at the conclusion of the report. The study consisted of three phases of work effort. The first phase involved an analysis of the navigation task, an identification of the variables influencing sextant operations, and an identification of problems associated with the use of sextants currently available. Based on the analysis, human factors criteria were established and design requirements were developed. Critical design problems which could not be solved by the application of available human factors data were subjected to critical examination in the laboratory. The results of these investigations provided a basis for specific design recommendations for use in the development of an improved handheld sextant.

AD-609 092 Div. 19, 1, 23, 28
OTS Prices: HC $2.00/MF $0.50

Human Factors Research, Inc., Los Angeles, Calif.
GEOGRAPHIC ORIENTATION IN AIRCRAFT PILOTS: EXPERIMENTAL STUDIES OF TWO CARTOGRAPHIC VARIABLES,
by James J. McGrath, William E. Osterhoff and Gail J. Borden. Nov 64, 46p Human-TR-751-3
Contract Nonr421800

Unclassified report

Descriptors: (*Navigation, Pilots), (*Navigational charts, Aviation safety), (*Human engineering, Navigational charts), Mapping, Aeronautics, Plotting boards, Visual signals, Visual perception, Training devices, Flight simulators, Low altitude, Motion pictures, Display systems, Performance (Human).

In the development of aeronautical charts and navigation displays, criteria are needed for two fundamental design decisions: What information should the chart contain. How should that information be displayed. The purpose of the present research was to test two hypotheses concerning cartographic design. One experiment dealt with a specific aspect of information content in aeronautical charts, and the other dealt with an aspect of information display in aeronautical charts. The experiments served two additional purposes. One was to provide a preliminary assessment of chart types by comparing orientation performances with the two charts most commonly used by pilots of light attack aircraft: the Sectional Aeronautical Chart and the USAF Operational Navigation Chart (ONC). The other purpose concerned a methodological question, which is described in detail in this report, dealing with whether or not the sensitivity of the performance measures obtained by the cinema method could be increased by certain changes in the experimental procedures.

AD-609 208 Div. 19, 12
OTS Prices: HC $4.00/MF $1.00

Applied Physics Lab., JHU, Silver Spring, Md.
EVERYMAN'S DOPPLER SATELLITE NAVIGATION SYSTEM,
by Robert R. Newton. Jul 64, 116p TG-590
Contract NOw62 0604c Unclassified report
Descriptors: (*Navigation satellites, Doppler effect), (*Doppler systems, Position finding), (*Doppler navigation, Doppler systems), Radio transmission, Radio signals, Inertial navigation, Tracking, Tables.

This paper describes a system of navigation by measuring the Doppler shift in the radio transmissions from a near-Earth satellite. The paper describes simple equipment for making the measurements. It also shows that the need for current information which must be supplied to the navigator can be reduced to the reception of a number containing six decimal digits. Finally, it shows that the computations needed for the navigator to obtain a fix can be performed with the aid of tables that can be prepared at least 18 months into the future. Using these tables and a simple slide rule, but no other computational aids, a fix accurate to about 500 meters can be obtained in about ten minutes. More accuracy can be obtained at the expense of time, or time can be saved at the expense of accuracy. (Author)

20. Nuclear Physics and Nuclear Chemistry

AD-608 964 Div. 20
OTS Prices: HC $6.00/MF $1.25

Defense Atomic Support Agency, Albuquerque, N. Mex. Atomic Weapons Training Group.
PRINCIPLES OF NUCLEAR PHYSICS.
24 Mar 60, 234p

Unclassified report

Descriptors: (*Nuclear physics, Handbooks), Instruction manuals, Physics, Atomic properties, Nuclear structure, Nuclear particles, Radioactivity, Nuclear reactions Health physics.

This publication, has been issued as a source of background information for students attending the nuclear courses of the Atomic Weapons Training Group, DASA. Students whose training in physics is incomplete, or who lack an understanding of the unclassified aspects of nuclear phenomena as revealed by modern research, will find the information in this publication of value in comprehending course material. Because this publication deliberately has been slanted toward a specific objective, it makes no claim of being exhaustive or all-inclusive. Instructors will be glad to recommend standard texts available from the Atomic Weapons Training Group, when further information is required.

AD-609 004 Div. 20, 14, 17
OTS Prices: HC $1.00/MF $0.50

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST. ABSTRACT NO. 25723 TO 25762.
Rept. for 1-30 Nov 64.
10 Dec 64, 19p REIC-MAL-81
Contract AF33 615 1124, AF33 657 10085

Unclassified report

Descriptors: (*Materials, Radiation damage), (*Radiation damage, Abstracting), Bibliographics, Radiation chemistry, Ceramic materials, Metals, Organic materials, Polymers, Electronic equipment, Space environmental conditions.

Contents: Dates Covered: November 1, 1964 to November 30, 1964; Metallic Materials; Ceramic Materials; Organic Materials; Polymeric Materials; Inorganic Materials; Electronic Materials, Components, and Devices; Facilities; Space Environment and Effects; On Materials; Experimental Devices and; Techniques; Miscellaneous.

AD-609 049 Div. 20, 13, 18
OTS Prices: HC $2.00/MF $0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
AN EMPIRICAL FORMULA FOR CALCULATING GAMMA-RAY DOSE ATTENUATION IN CONCRETE DUCTS.
Technical rept.,
by W. C. Ingold and C. M. Huddleston. 25 Nov 64, 64p
Task Y F008 08 05 201
NCEL R349; DASA 11.026

Unclassified report

Descriptors: (*Dose rate, Programming (Computers)), (*Shelters, Radiation hazards), (*Ducts, Radioactive fallout), (*Gamma rays, Radiation hazards), Shielding, Radiation measurement systems, Concrete, Underground structures, Computers, Geometry, Attenuation, Albedo, Scattering, Mathematical analysis, Equations.

A survey is presented of the current status of the calculation of gamma-ray dose-rate attenuation in air ducts through concrete. A simple empirical formula is exhibited which shows satisfactory agreement with the results of more complicated computational techniques and with experimental results. This simple formula represents a large saving in computation time -- 2 seconds per case compared to 400 seconds by IBM-1620 computer. Its validity is established for a wide range of duct geometries and for gamma-ray energies up to 3 Mev. (Author)

AD-609 057 Div. 20, 25
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Fullerton, Calif.
STUDY OF SIMULATION TECHNIQUES FOR LABORATORY SIMULATION OF NUCLEAR RADIATION ENVIRONMENTS.
Final rept. for 1 Dec 63-30 Nov 64,
by K. G. Kerris, C. A. Bordeaux, and K. Whitham.
30 Nov 64, 70p HAC-FR64-10-317
Contract Nonr435900

Unclassified report

Descriptors: (*Electrons, Storage), (*Electron accelerators, Simulators), (*Magnets, Electron accelerators), Synchrotrons, Betatrons, Electron beams, Particle accelerators, Magnetic fields, Magnetic moments, Magnetic resonance, Magnetism, Electric fields, Particle beams, Integral transforms, Fourier analysis, Vacuum apparatus, Differential equations, Simulation, Nuclear particles, Oscillation, Analog computers.

The feasibility of a 15 MeV 1000 ampere electron storage ring is demonstrated. The work reported is the continuation of the electron storage ring feasibility study begun under Contract NOnr 3481(00). All the important beam loss mechanisms are treated, including space charge and coherent and incoherent image force effects. The problem of imperfection and coupling resonances is discussed. The analytical work led to the design of a 1/4 scale model magnet. The results of magnetic field mapping in this magnet are presented. Finally, a preliminary storage ring design which is considered feasible is discussed. (Author)

AD-609 097 Div. 20, 2
OTS Prices: HC $3.00/MF $0.75

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
EARTH-MOTION MEASUREMENTS.
Final rept.,
by L. F. Ingram. 20 Nov 64, 71p
Proj. 1.2
DASA POR1811

Unclassified report

Rept. on Project Danny Boy, Nevada Test Site, 5 Mar 62.

Descriptors: (*Createring, Underground explosions), (*Underground explosions, Createring), (*Nuclear explosions, Createring), Earth, Motion, Basalt, Rock (Geology), Soils, Measurement, Accelerometers, Velocity, Meters, Mechanical waves, Shock waves, Attenuation, Electronic recording systems, Experimental data, Seismology.

The objective of Danny Boy Project 1.2 was to measure ground motion resulting from an underground nuclear detonation in basalt. This report presents and analyzes the measurements obtained from 31 vertically and horizontally oriented accelerometers and 3 vertically oriented velocity meters. The accelerometers and velocity meters were placed in the region extending horizontally from 3 to 610 meters from Surface Zero (SZ). All were placed near the surface (i.e. at depths of about 1/3 meter) except the accelerometer at the 3-meter station which was buried 18.3 meters deep. Peak acceleration values were considerably less than anticipated. Because of low amplifier gain settings used in anticipation of higher signal levels, usable records were obtained on only 22 channels. However, because of the low acceleration levels, close-in measurements (i.e. close to SZ), which were of primary interest, were successfully made. (Author)

AD-609 143 Div. 20, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PLASMA DIAGNOSTICS: PT. 1,
by S. Lukyanov. 25 Nov 64, 12p
FTD TT64 100; TT 65 60438
Unclassified report

Edited trans. of Metaniereba da Tekhnika (USSR) 1959, no. 10, p. 4-7.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-609 147.

Descriptors: (*Thermonuclear reactions, Control), (*Plasma medium, Hydrogen), USSR, Measurement, Nuclear reactors, High temperature research, Light, Thermometers.

This report is a popularized article on hydrogen plasma research and thermonuclear reaction control. Basic characteristics of a plasma are discussed and a method of measuring very high temperatures with a light beam is proposed.

AD-609 147 Div. 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PLASMA DIAGNOSTICS: CONCLUSION,
by S. Lukyanov. 25 Nov 64, 13p
FTD TT64 101; TT 65 60442
Unclassified report

Edited trans. of Metaniereba da Tekhnika (USSR) 1959, no. 11, p. 14-17.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-609 143.

Descriptors: (*Thermonuclear reactions, Control), (*Plasma medium, Hydrogen), Photographic analysis, Photographic techniques, Nuclear reactors, High temperature research, Density, Pressure, Measurement, USSR, Magnetic fields, Piezoelectric gages, Radio waves.

This report is a popularized article on hydrogen plasma research and thermonuclear reactions. Methods and techniques for photographic analysis of a short lifetime plasma are discussed. Several methods for density and pressure measurements of the plasma are proposed and discussed. One of them is based on the state of equilibrium between plasma pressure and the surrounding magnetic field; a second a piezoelectric manometer; a third is based on probing the plasma with radio waves and a fourth employs measurement of the over-all intensity of the emission from the plasma.

AD-609 153 Div. 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE CONTROLLED PLASMA,
by J. Lominadze and N. Tsintsadze. 25 Nov 64, 11p
FTD TT64 102; TT 65 60453
Unclassified report

Edited trans. of Metaniereba da Tekhnika (USSR) 1961, no. 12, p. 25-28.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermonuclear reactions, Control), (*Reactor moderators, Magnetic fields), (*Magnetic fields, Reactor moderators), Plasma medium, Hydrogen, Charged particles, Magnetic pinch, Particle accelerators, High-temperature research.

A popularized article on the use of magnetic fields as moderator in nuclear reactors to contain and preserve a high-temperature plasma. The plasma is used to produce controlled thermonuclear reactions.

AD-609 198 Div. 20, 10
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
VULNERABILITY OF FUEL STORAGE TANKS TO NUCLEAR BLAST; RESPONSE AND SCALING OF FLOATING ROOF TANKS,
by W. R. Elswick, L. A. Gore, and C. A. Sandoval.
18 Apr 56, 33p RM-1677
Contract AF49 638 700
Unclassified report

Rept. on Proj. RAND.
Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Fuel tanks, Nuclear explosions), (*Nuclear explosions, Storage tanks), Shock waves, Pressure, Distribution, Loading (Mechanics), Mathematical analysis, Hydrostatic pressure, Equations, Motion, Liquids, Vulnerability.

The vulnerability of bulk fuel storage is of major concern in the survival of Air Force weapon systems subject to nuclear attacks. The vulnerability of three types of storage tanks is of interest; the underground tank, the floating roof tank with strengthened shell and the ordinary cone roof tank. The floating roof, particularly if placed in a hard shell, presents some obviously interesting characteristics from the point of view of vulnerability. It is capable of withstanding significantly large pressures if the pressures are uniformly distributed. But, if the pressures are nonuniformly distributed and also vary with time, such as those produced by a nuclear blast wave, the floating roof will be displaced and the dynamic response of the liquid under the floating roof will determine the vulnerability of the roof and the contents of the tank. A thorough understanding of these dynamic conditions is necessary before the potential resistance of floating roof tanks can be evaluated or before actual tests can be profitably undertaken.

AD-609 272 Div. 20, 17
OTS Prices: HC $2.00/MF $0.50

Naval Research Lab., Washington, D. C.

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS.
Quarterly progress rept. 1 Aug-31 Oct 64,
by L. E. Steele, J. R. Hawthorne, and C. Z. Serpan, Jr.
15 Nov 64, 30p
Contract AT49 5 2110, Projs. RR007 01 46 5409, SR007 01 01, Task 0858
NRL MR1572

Unclassified report

See also AD-602 159.

Descriptors: (*Reactor materials, Steel), (*Steel, Radiation damage), (*Radiation damage, Reactor materials), Metal plates, Heat treatment, Ductility, Pressure vessels, Structural parts, Environmental tests, Radiation measurement systems, Aging (Materials), Transition temperature, Nuclear reactors, Test methods, Monitors.

This report, covering research for the period 1 August 1964 - 31 October 1964, includes the following: (1) simultaneous irradiation of six heavy plate structural steels at 700F and of A350-LF3 and A212-B steels at 500F, (2) effect of nuclear environment on pressure vessel steels, (3) comparison of fission and threshold flux monitors, (4) program for studying nuclear environmental effects in other than light water reactors, and (5) progress toward evaluation of OMRE components (removal of section of the OMRE grid plate). (Author)

AD-609 289 Div. 20, 30
OTS Prices: HC $3.00/MF $0.75

Ballistic Research Labs., Aberdeen Proving Ground, Md.
BLAST PATTERNS IN COMPLEX TUNNEL MODELS,
by George D. Teel. Apr 64, 54p
BRL TN1533

Unclassified report

Supported by Bureau of Yards and Docks, Washington, D. C.

Descriptors: (*Nuclear explosions, Underground structures), (*Blast, Shock tubes), (*Shock tubes, Nuclear explosions), (*Test models, Shock tubes), Terminal ballistics, Nuclear weapons, Shock waves, Meters, Pressure, Time.

The Ballistic Research Laboratories detonation-driven shock tube was utilized to expose four complex tunnel models to high pressure blast waves. The models were exposed to shock pressures of 200, 500, and 800 psi. The data obtained from the shock tube tests were reduced, plotted, and extrapolated to give expected values for the models when exposed to a 1500 psi shock wave from a 10 megaton nuclear weapon. (Author)

AD-609 302 Div. 20, 8, 25
OTS Prices: HC $5.00/MF $1.25

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
RADIATION EFFECTS PARAMETERS IN NAP APPLICATIONS.
Final rept. for Jun 63 - Oct 64,
by R. M. Magee. Nov 64, 190p BSR-988
Contract AF29 601 5911, Proj. 1831, Task 183106
WL TDR64 97

Unclassified report

Descriptors: (*Radiation damage, Transistors), (*Transistors, Radiation damage), Silicon, Germanium, Neutrons, Neutron spectrum, Gamma rays, Gamma-ray spectra, Tests, Neclear reactors, Reactor shielding materials, Hydrogen, Water, Radiation measurement systems, Astronautics.

The radiation effects caused by different neutron-energy spectra and neutron-to-gamma flux ratios have been determined for several silicon transistors. Tests conducted on four planar transistor types (2N709, 2N914, 2N1711, and 2N2894) showed that neutron-to-gamma ratio effects are most significant at low radiation exposures. At these exposures, the damage from gamma radiation may be a significant fraction of the total radiation damage. At higher radiation exposures, neutron effects predominate, and the neutron-spectrum effects may be significant. Calculations of displacement-induced damage showed qualitative but not quantitative agreement with the results of reactor tests. It was also found that other parameters have important effects on the radiation damage observed. In particular, electrical measurement and operating conditions during irradiation can have at least as much effect as do neutron-spectrum or neutron-to-gamma ratio variations. (Author)

AD-609 308 Div. 20, 13, 14
OTS Prices: HC $2.00/MF $0.50

Radiation Research Associates Inc., Fort Worth, Tex.
SIMPLIFIED METHODS FOR CALCULATING THE PENETRATION OF NEUTRON AND GAMMA RADIATION INTO UNDERGROUND CONCRETE STRUCTURES,
by D. G. Collins, R. L. French, L. G. Mooney, K. W. Tompkins, and M. B. Wells. 25 Nov 64, 34p RRA-M45

Unclassified report

Paper to be presented at the 1964 Winter Meeting of the American Nuclear Society, San Francisco, Calif., 30 Nov-3 Dec 1964.
Work supported by the Oak Ridge National Lab. under subcontract no. 2267; funded by the Defense Atomic Support Agency.

Descriptors: (*Radiation damage, Underground structures), (*Underground structures, Concrete), (*Neutrons, Underground structures), (*Gamma rays, Underground structures), (*Monte Carlo methods, Albedo), Shielding, Thermal neutrons, Neutron flux, Penetration, Dose rate, Neutron capture, Fast neutrons, Scattering, Neutron transport theory, Experimental data.

The analysis of two experiments performed at the Oak Ridge National Laboratory's Tower Shielding Facility provides a basis for the development and evaluation of simplified methods for predicting the prompt weapons radiation intensities inside underground concrete structures. Using the TSR-II in a special shield to simulate a nuclear weapon radiation environment, one experiment mapped the radiation inside two concrete bunkers with an interconnecting tunnel located in a hillside approximately 700 feet from the source. The other experiment mapped the radiation in concrete-lined cylindrical holes at distances of 100, 228 and 450 feet from the reactor. In both experiments the openings of the underground structures were shielded with various thicknesses of concrete. Albedo methods were developed for calculating neutron and gamma-ray reflection from the concrete walls of the structures and for calculating gamma dose rates due to thermal neutrons captured in the walls. Penetration calculation methods which consider the energy and angular distributions of the incident and emergent radiations were also developed.

AD-609 315 Div. 20, 17, 25
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana.
THE MOSSBAUER EFFECT OF FE57 ON THE SURFACE OF TUNGSTEN.
Technical note no. 2,
by John Williams Burton. 1963, 86p
Contract AF49 638 1048

Unclassified report

Doctoral thesis.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Tungsten, Mossbauer effect), (*Mossbauer effect, Tungsten), (*Iron, Mossbauer effect), Resonance absorption, Absorption spectrum, Crystal lattices, Surfaces, Gamma rays, Single crystals, Electric fields, Mathematical analysis, Atoms, Programming (Computers).

The Mossbauer effect of Fe57 on the surface of polycrystalline tungsten was measured over a temperature range of 80 - 500K, and at angles of 0 degrees and 60 degrees with respect to the normal. The Mossbauer spectra consist of three unresolved lines, the middle one agreeing with measured spectra of Fe57 in the bulk of tungsten, and the outer two being attributed to surface effects. The assymmetry of the surface spectra, the angular dependence of the shape, and the magnitude of the splitting of the two surface lines indicate an electric field gradient at the surface of 2.4 x 10 to the 16th power V/sq cm directed along the normal. An effective Debye temperature of 406 ± 12K is found for the bulk, from a study of the temperature dependence of the intensity of the Mossbauer absorption. The effective Debye temperature for the surface is 354 ± 30K along the normal, and 255 ± 30K parallel to the surface. The angular dependence of the total intensity of the two surface lines agrees with a simple theory for an atom bound above the top layer of the host lattice. The isomer shift with respect to iron at 300K is .0151 ± .0002 cm/sec in the bulk, and .018 ± .002 cm/sec on the surface. (Author)

AD-609 413 Div. 20
OTS Prices: HC $3.00/MF $0.75

Naval Radiological Defense Lab., San Francisco, Calif.
DESIGN CRITERIA FOR ROOF WASHDOWN. PHASE II. FALLOUT REMOVAL STUDIES ON TYPICAL ROOFING SURFACES FOR THREE SIZE RANGES OF PARTICLES (44 to 88 microns, 88 TO 177 microns, AND 590 TO 1190 microns),
by R. H. Heiskell, W. S. Kehrer, and N. J. Vella.
11 Aug 64, 70p
Contract CDM SR59 54, Task 1113A
USNRDL TR789

Unclassified report

Descriptors: (*Radioactive fallout, Decontamination), (*Decontamination, Roofs), Particle size, Water, Fluid flow, Surfaces, Aluminum, Composite materials, Metals, Laminated plastics, Glass textiles, Epoxy plastics, Effectiveness, Simulation, Design, Geometric forms.

Fallout simulant particles ranging in size from 44 to 88, 88 to 177 and 590 to 1190 microns were deposited at a rate of approximately 2 grams/min/sq ft for a period of 30 min on selected typical roof section 48 ft long by 8 ft wide, to determine the effect of water flow rate, slope, and surface type on washdown effectiveness. A residual mass of less than 10% of the 590 to 1190 microns particles was obtained on aluminum shingles, composition shingles, roll roofing, corrugated metal and fiberglass epoxy laminated roof with a maximum of 3.5 gallons of water per minute per foot of roof width (gpm/ft) at a slope of 1:8 or greater. Thirty-five to forty-five percent of the 88 to 177 microns particles was retained on the corrugated metal at this same slope with a water flow of 3.5 gpm/ft of width. A residual of 5% or less was obtained on roll roofing at a slope of 1:8 or greater with a water flow of 3.5 gpm/ft of width with both the 88 to 177 and the 590 to 1190 microns particles. With the same two particle sizes, a residual of 5% or less was obtained on a fiberglass epoxy laminated roof with a maximum water flow of 1.0 gpm/ft of width at a slope of 1:12 or greater. (Author)

AD-609 430 Div. 20, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NUCLEAR WEAPONS AND LIMITED WARFARE. A SKETCHBOOK HISTORY,
by G. C. Reinhardt. Nov 64, 14p P-3011

Unclassified report

Prepared for the October 19-23, 1964 Conference of the Walter Reed Army Research Institute.

Descriptors: (*Nuclear weapons, Limited warfare), (*Limited warfare, Nuclear weapons), Tactical warfare, Military strategy, Nuclear warfare, History.

21. Nuclear Propulsion

No Entries

22. Ordnance

AD-609 024 Div. 22, 25
OTS Prices: HC $2.00/MF $0.50

High Velocity Lab., Univ. of Utah, Salt Lake City.
PENETRATION AND PERFORATION STUDIES OF THIN GLASS TARGETS.
Technical rept.,
by Merlin D. Fullmer, William S. Partridge, and Emerson T. Cannon. Aug 58, 43p UU-2
Contract AF04 647 176

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Glass, Penetration), (*Terminal ballistics, Targets), (*Targets, Penetration), Impact shock, Stresses, Spheres, Steel, Tungsten, Thickness, Toughness, Kinetic theory, Acceleration, Energy, Velocity.

Steel spheres 3/32 inches in diameter were accelerated to velocities in the range of 0.1 to 2.5 km/sec. and impacted normally upon ordinary plate glass targets 4 inches square and 3/64, 1/16, 1/8, 1/4 and 1/2 inches thick. Tungsten spheres 1/16 inches in diameter were also impacted in the same manner as the steel spheres at velocities from 2.0 to 2.5 km/sec. into 1/4- and 1/2-inch thick glass. Steel BB shot 1/4 inch in diameter were impacted in the same manner as previously described into the 3/64-inch thickness at the 0.1 km/sec. velocity range. It was found that the kinetic energy lost by the pellet during perforation of the target was a function of the impact velocity to the second power. Therefore, parabolas could be used to approximate these curves. The plot of the minimum velocity of perforation as a function of target thickness was found to be a straight line relationship. The manner in which the energy dissipates in the glass was qualitatively explained. (Author)

AD-609 030 Div. 22, 25
OTS Prices: HC $2.00/MF $0.50

High Velocity Lab., Univ. of Utah, Salt Lake City.
PERFORATION OF THIN ALUMINUM TARGETS,
Technical rept.,
by Charles R. Morris, William S. Partridge, and Emerson T. Cannon., Aug 58, 47p UU-1
Contract AF04 647 176

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Terminal ballistics, Aluminum), (*Aluminum, Terminal ballistics), Sheets, Targets, Thickness, Steel, Spheres, Velocity, Impact shock, Penetration, Loading (Mechanics), Stresses, Mathematical prediction, Photographic analysis, Dynamics.

Steel spheres were accelerated to a velocity in the range between 0.5 km/sec to 2.63 km/sec and were impinged normally upon thin targets of aluminum. The amount of energy lost by a pellet in perforating a target was found to be directly proportional to the kinetic energy of the impinging pellet. The minimum amount of energy required for a pellet to perforate Al was found to be an increasing function of target thickness. It was also found that the hole diameter increased as the impact velocity increased. (Author)

AD-609 031 Div. 22
OTS Prices: HC $3.00/MF $0.75

High Velocity Lab., Univ. of Utah, Salt lake City.
PENETRATION AND CRATERING.
Quarterly rept. no. 13 (Final), 1 Apr 58-30 Jun 61,
by E. P. Palmer. 13 Oct 61,53p UU-7
Contract AF04 647 176
BSD TDR62 11

Unclassified report

Descriptors: (*Terminal ballistics, Cratering), (*Cratering, Terminal ballistics), (*Hypervelocity projectiles, Materials), Penetration, Targets, Projectiles, Hypervelocity guns, Electric arcs, Impact shock, Energy, Aluminum, Glass, Lead, Shock waves, Equations.

Effects of target and projectile materials on crater volume, area and penetration are given and empirical impact laws derived. Preliminary measurements of subsurface flow and wave propagation and of surface flow in cratering are reported. Production of micron-sized spray particles with velocities to 25 km/sec is reported. Experiments on wave propagation in rods are outlined. Results of electric-arc-heated gun development are reported. (Author)

AD-609 039 Div. 22
OTS Prices: HC $2.00/MF $0.50

Malaker Labs., Inc., High Bridge, N. J.
DEBRIS DISTRIBUTION IN UNDERWATER EXPLOSIONS.
Annual summary rept. for 1 Jan 63-1 Jan 64,
by Earl F. Bryant. Jan 64, 32p Malaker-CM-102-4
Contract Nonr309500

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Underwater explosions, Explosion effects), (*Explosion effects, Underwater explosions), Fragmentation, Exploding wires, Bubbles, Phase studies, Mineral oils, Test methods, Simulation, Vacuum, Labeled substances, Shock waves, Photographic analysis, High-speed photography, Motion pictures, Experimental data, Explosion bubbles.

During this reporting period (January 1, 1963, to January 1, 1964), above and below surface effects of underwater explosions were investigated through use of exploding wire equipment. A correlation between bubble phases and deposition of debris was sought and a means was devised to measure debris concentration in certain water column areas. The report includes data obtained from underwater bubble studies and a description of the apparatus being prepared for the above surface investigation. Data from more than sixty underwater bubble experiments was obtained. Underwater debris deposition was studied by means of high speed motion picutres of wires exploded in light mineral oil. Above surface effects of radioactive exploding wires submerged in scintillation solution are being investigated by means of a sensitive photoelectric scanner.

AD-609 196 Div. 22
OTS Prices: HC $2.00/MF $0.50

General Applied Science Labs., Inc., Westbury, N. Y.
FLOW FIELD OF A SPHERICAL PELLET AT BALLISTIC RANGE CONDITIONS IN ARGON,
by G. F. Widhopf. 8 Dec 64, 27p GASL-TR-478
Contract SD149, Proj. 8010, ARPA Order 396

Unclassified report

Descriptors: (*Ballistics, Argon), (*Pellets, Ballistics), Spheres, Transport properties, Gas flow, Viscosity, Diffusion, Temperatures, Hypersonic flight, Reynolds number, Reentry vehicles, Boundary layer.

This report was prepared in response to a request by personnel of Lincoln Laboratory to have available a detailed description of the flow field of a spherical pellet, at a specified ballistic range condition in argon. A similar calculation of flow field details was performed for an air atmosphere at the aforementioned velocity and pressure.

AD-609 241 Div. 22, 30
OTS Prices: HC $1.00/MF $0.50

Army Frankford Arsenal, Philadelphia, Pa.
STUDY AND EVALUATION OF SPECIAL LEAK TEST INSPECTION EQUIPMENT.
Final rept.,
by A. H. Getzel and C. Fairburn. Apr 59, 14p
MIC-19B
Proj. 56 6 56 6 15

Unclassified report

Descriptors: (*Gas leaks, Test equipment), (*Test equipment, Gas leaks), (*Ammunition, Gas leaks), Ammunition components, Containers, Fuzes (Ordnance), Cartridges, Hermetic seals, Tests, Test methods, Gas detectors, Pressure vessels, Vacuum apparatus, Nondestructive testing, Design.

This report is a study of various industrial nondestructive leak detecting equipment for ordnance ammunition items such as fuzes, cartridge actuated devices and cartridges. A physical investigation was made of the bubble counter system, the bubble indicator system, and the differential pressure system. Only a literary investigation was made of the trace gas system. Of the systems evaluated, the pressure indicator system was found to be most suitable for working with small sealed items of ordnance as well as being simple and speedy in operation. However, further test must be conducted before conclusive results can be obtained. (Author)

AD-609 261 Div. 22, 17
OTS Prices: HC $4.00/MF $0.75

Watervliet Arsenal, N. Y.
APPLICATION OF MARAGING STEELS.
Conference rept.,
6 Feb 64, 113p Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Maraging steels, Symposia), (*Gun components, Maraging steels), Nickel alloys, Titanium alloys, Molybdenum alloys, Cobalt alloys, Fatigue (Mechanics), Gun barrels, Mechanical properties, Performance (Engineering), Material forming, Machining, Tensile properties, Strain (Mechanics), Extrusion, Microstructure.

AD-609 403 Div. 22
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
EFFECTS OF UNDERWATER EXPLOSIONS ON ELASTIC STRUCTURES,
by George Chertock. Nov 64, 15p
Proj. S R011 01 01
DTMB 1924

Unclassified report

Reprinted from Symposium on Naval Hydrodynamics (4th), Aug 62, ONR-ACR-92.

Descriptors: (*Underwater explosions, Structures), (*Underwater objects, Underwater explosions), Theory, Mathematical analysis, Integral equations, Differential equations, Structural properties, Elasticity, Vibration, Shock waves, Pressure, Hydrodynamics.

The elastic response of a submerged structure to an underwater explosion is analyzed mathematically as a problem in hydroelasticity. First the effective pressure field from the explosion is described in terms of the time variation of the volume of the explosion bubble, and the complex motions of the structure are expressed in terms of the normal modes of free vibration of the structure in water. A differential equation is then derived for the motion; where the generalized force is shown, by a reciprocity principle, to depend separately on the history of the explosion bubble without the target, and the pressure field due to the motion of the target without the explosion. Finally some representative solutions of the differential equation are discussed to show in particular how the amplitude of vibration depends on possible synchronization between the pulsation period of the explosion bubble and the vibration period of the structure. (Author)

23. Personnel and Training

AD-608 993 Div. 23
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DEVELOPING THE RECRUITING POTENTIAL OF SUMMER PROGRAMS,
by Jerry J. Jensen. Nov 64, 32p P-3018
Unclassified report

Descriptors: (*Students, Personnel management), (*Personnel management, Students), Management engineering, Industrial relations, Employee relations, Manpower studies, Budgets, Performance (Human).

In this article some failures of summer programs are analyzed, some basic principles for developing their recruiting potential are suggested. Details on how to run a summer program are not discussed because administrative techniques that work in one company may not work in another. Nevertheless, several principles that can be practiced effectively in any organization are discussed.

AD-609 032 Div. 23, 28
OTS Prices: HC $2.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
FACTOR ANALYSIS OF EXPERIMENTAL NON-COGNITIVE MEASURES OF COMBAT POTENTIAL,
by C. D. Johnson, L. K. Waters, and W. H. Helme.
Jun 64, 39p
Proj. 2J024701A722
APRO TRN147
Unclassified report

Descriptors: (*Army personnel, Psychometrics), (*Psychometrics, Army personnel), (*Factor analysis, Army personnel), Personality, Aptitude tests, Leadership, Emotions, Stability, Motivation, Attitudes, Stress (Psychology), Performance (Human), Selection, Correlation techniques, Warfare.

As a means of identifying personality factors important in combat potential, scores on 19 noncognitive aptitude tests, 5 measures of avocational information, 7 cognitive tests of the ACB, and one experimental perceptual speed measure were factor-analyzed. Results were extended to criteria--peer and supervisor ratings on combat potential obtained after 16 weeks of AIT and in an overseas maneuver situation after one year. Comparison was made with a similar study in a Korean combat sample. Two of eight factors identified--general cognitive ability and a mechanical-social factor--were valid for the criterion of combat potential. The first factor stood up well in an independent sample while the second was somewhat less valid in the cross sample. The two factors valid in the peacetime structure appeared to reflect ratings based more on the individual's overall competence and readiness to do his job and work for group goals, whereas actual combat ratings placed greater emphasis on leadership and emotional stability under stress. Results have been applied as a conceptual framework for the development of experimental tests to measure the factors identified. (Author)

AD-609 035 Div. 23
OTS Prices: HC $2.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
ARMY SCHOOL TRAINING PERFORMANCE OF EM SCORING LOW ON AFQT,
by William H. Helme. Oct 64, 33p
Proj. 2J024701A722
APRO TRR1140
Unclassified report

Descriptors: (*Army personnel, Psychometrics), (*Army training, Aptitude tests), (*Aptitude tests, Manpower studies), Selection Training, Performance (Human), Statistical analysis Military requirements.

In response to the Army's need to attain optimal use of manpower sills and aptitudes, the New Classification Techniques Task is engaged in a continuing series of studies to develop increasingly accurate and differentiated measures of individual potential. One objective of the Task is to determine the extent to which men of low or low average general ability can be successfully trained in Army school courses. Studies to evaluate Army classification tests as predictors of success in MOS training included enlisted men admitted from 1953-1957 whose AFQT scores were below current enlistment standards. From available data on 48 courses, estimates were made of the expected success in training of enlisted men in AFQT category IV (10th to 30th percentile) and in lower category III (31st to 49th percentile). Substantial numbers of AFQT category IV enlisted men could successfully complete MOS training courses of moderate or low difficulty level. However, suppleentary aptitude area prerequisites are essential to assure selection of men who have sufficient probability of success in a given course to keep attrition at permissible levels--usually under 10 percent. For the more difficult courses, failure rates of category IV men were estimated as generally exceeding acceptable levels, even in courses for which the men had attained the requisite 90 or 100 aptitude area scores. (Author)

AD-609 122 Div. 23, 28, 29
OTS Prices: HC $5.00/MF $1.00

Rowland and Co., Haddonfield, N. J.
ATTITUDES OF TROOPS IN THE TROPICS. VOLUME ONE. EQUIPMENT AND SITUATIONAL EVALUATIONS.
Final rept., phase 2,
by Gary L. Hart, Richard A. Faust, Jr., George E. Rowland, and R. Omer Lucier. 12 Oct 64, 161p
R and C-64-19, vol. 1
Contract DA19 129QM2076N, Proj. 7X95 01 001
Unclassified report

Descriptors: (*Army personnel, Tropical regions), (*Psychometrics, Army personnel), (*Human engineering, Armed forces supplies), (*Attitudes, Army personnel), Projective techniques, Acclimatization, Protective clothing, Statistical data, Test methods, Panama, Hawaii.

The final conclusions relating to attitudes of troops stationed in tropical environments are presented. Data was collected from 2160 United States Army troops stationed in Panama, Hawaii and Okinawa, and representing a variety of branches such as Infantry, Airborne, Missile, etc. Attitudes toward specific items of Quartermaster issue are reported and interaction effects among population elements and situational variables are detailed. The data is presented in such a manner as to be of guidance value to equipment designers. (Author)

AD-609 123 Div. 23, 28, 29
OTS Prices: HC $5.00/MF $1.00

Rowland and Co., Haddonfield, N. J.

ATTITUDES OF TROOPS IN THE TROPICS. VOLUME TWO. METHODOLOGICAL IMPLICATIONS.
Final rept., phase 2,
by Gary L. Hart, Richard A. Faust, Jr., George E. Rowland, and R. Omer Lucier. 12 Oct 64, 151p
R and C-64-19, vol. 2
Contract DA19 129QM2076N, Proj. 7X95 10 001
Unclassified report

Descriptors: (*Army personnel, Tropical regions), (*Psychometrics, Army personnel), (*Human engineering, Armed forces supplies), (*Attitudes, Army personnel), Projective techniques, Acclimatization, Protective clothing, Statistical data, Test methods, Panama, Hawaii.

The final methodological considerations and conclusions relating to the development of new attitude measuring techniques are presented. 2160 U. S. troops stationed in Panama, Hawaii and Okinawa participated in this study as subjects. Complementary 'objective' and 'projective' techniques were compared and contrasted for their efficacy in assessing the attitudes of tropical troops towards items of Quartermaster issue and situations relating to tropical military service. A novel dimensionalizing technique was developed for attitude assessment. A method for evaluating response validity by way of a Respondent Consistency Check in the Objective attitude measuring instrument was developed and tested. (Author)

AD-609 124 Div. 23, 28, 29
OTS Prices: HC $3.00/MF $0.75

Rowland and Co., Haddonfield, N. J.
ATTITUDES OF TROOPS IN THE TROPICS. VOLUME THREE. DATA COLLECTION INSTRUMENTS.
Final rept., phase 2,
by Gary L. Hart, Richard A. Faust, Jr., George E. Rowland, and R. Omer Lucier. 12 Oct 64, 88p
R and C-64-19, vol. 3
Contract DA19 129QM2076N, Proj. 7X95 01 001
Unclassified report

Descriptors: (*Army personnel, Tropical regions), (*Psychometrics, Army personnel), (*Human engineering, Armed forces supplies), (*Attitudes, Army personnel), Projective techniques, Acclimatization, Protective clothing, Statistical data, Test methods, Panama, Hawaii.

Volume Three of a three-volume report is presented. Volume One contains the major body of the descriptive text pertaining to attitudinal data. Volume Two is a methodological treatise. Volume Three contains literal copies of the actual instruments which were used in the final exploratory field stage of data collection. For reasons of expediency the questionnaires and booklets used for the actual data collection were all printed on plain white paper. However, as a convenience, the copies contained herein have been color coded to assist the reader when reference is made from the text to specific instruments. Contents include: Objective tests (Osgood-type scale and Likert-type scale); Written Projective tests; Projective Pictures (written response and color response); Supportive Data Collection Techniques (Lowry-Lucier Reasoning Test Combination).

AD-609 156 Div. 23, 28, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CYBERNETICS IN SCHOOL.
by L. Landa. 23 Nov 64, 18p
FTD TT64 77, TT 65 60456
Unclassified report

Unedited rough draft trans. of Znanie-Sila (USSR) 1962, v. 37, no. 10, p. 33-35.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cybernetics, Education), (*Education, Cybernetics), Learning, Instructors, Students, Reasoning, Perception (Psychology), Training devices, Teaching machines, USSR.

AD-609 364 Div. 23, 1, 11
OTS Prices: HC $4.00/MF $1.00

Bell Aerosystems Co., Buffalo, N. Y.
PRELIMINARY INVESTIGATION OF TRAINING REQUIREMENTS FOR AIR CUSHION VEHICLE (ACV) OPERATORS,
by R. Flexman and G. S. Malecki. Aug 64, 135p
Contract N61339 1557
NAVTRADEVCEN 1557 1
Unclassified report

Descriptors: (*Operators (Personnel), Ground effect machines), (*Training, Operators (Personnel)), (*Ground effect machines, Training), Operation, Control panels, Control systems, Maneuverability, Performance (Human).

A study was made to assemble data relevant to ACV operator training and to provide estimates of operator training requirements. The following tasks were undertaken: description of ACV's and vehicle subsystems; identification of ACV application; description of ACV controls and displays; identification of natural and induced environmental factors; operator task descriptions; description of handling characteristics and techniques for U. S. Navy Hydroskimmer (SKMR-1); and estimates of skill and training requirements. The results of this study indicate that training requirements will vary with vehicle size, configuration, controls, mission, and operating environment. Among the areas effecting operation of ACV's and personnel training, the following appear to be in particular need of research and development attention: electronic equipment for navigation purposes; standardization and optimization of operator's controls and displays; and empirical determination of personnel training and training equipment requirements. (Author)

AD-609 428 Div. 23
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FRINGE BENEFIT EVALUATION THROUGH THE PROFILE-RANKING METHOD.
by Joseph C. Feldmeier, Jr. and William A. Groenekamp. Dec 64, 10p P-3028
Unclassified report

Rept. prepared for publication in Personnel, 1965, Jan - Feb.

Descriptors: (*Personnel management, Statistical analysis), (*Statistical analysis, Personnel management), Management control systems, Management planning, Employee relations, Industrial relations, Manpower studies, Bargaining.

A profile-ranking technique is developed that compares the contents and coverage of benefit programs, presented by various companies, in terms of their desirability to employees. A list of basic elements included in a benefit program is constructed and these elements are ranked by company representatives in order of importance to themselves and to their employees. An over-all, ideal fringe benefit profile can be itemized for the companies surveyed, giving management a clear, concise evaluation of the relative position of its fringe benefit program.

24. Photography and Other Reproduction Processes

AD-609 069 Div. 24, 30, 15
OTS Prices: HC $5.00/MF $1.00

Geo Space Corp., Melbourne, Fla.
RESEARCH IN MATHEMATICAL TARGETING. THE PRACTICAL AND RIGOROUS ADJUSTMENT OF LARGE PHOTOGRAMMETRIC NETS.
Final rept.,
by Duane C. Brown, Ronald G. Davis, and Frederick C. Johnson. Oct 64, 155p
Contract AF30 602 3007, Proj. 5569, Task 556902
RADC TDR64 353

Unclassified report

Rept. prepared under subcontract by Brown (D.) Associates, Inc., Eau Gallie, Fla.

Descriptors: (*Photogrammetry, Matrix algebra), (*Matrix algebra, Digital computers), (*Aerial photography, Photogrammetry), (*Digital computers, Photogrammetry), Theory, Errors, Photography, Equations, Numerical analysis, Iterative methods, Simulators, Geodesics, Test methods, Position finding, Corrections, Mathematical analysis, Vector analysis, Partial differential equations.

The problem of the rigorous simultaneous adjustment of large photogrammetric blocks is reviewed and extensions to an earlier theory are developed. Various matrix iterative approaches to the solution of the very large sytstems of normal equations characteristic of sizeable photogrammetric nets are investigated. The Method of Block Successive Over Relaxation is found to yield a practical and most satisfactory solution to this problem. Results of an extensive series of numerical simulations are reported. The successful application of the approach to a 23-photo strip of actual photography provides final confirmation of the validity and effectiveness of the solution. (Author)

AD-609 114 Div. 24, 8, 26
OTS Prices: HC $4.00/MF $1.00

National Cash Register Co., Dayton, Ohio.
HIGH RESOLUTION RAPIDLY PROGRAMMABLE MASKING FOR FUNCTIONAL ELECTRONIC BLOCKS,
by Mark Sobottke, Richard Cady, Clifford Kruer, and Laurence Brownsey. Nov 64, 124p NCR-28-F
Contract AF33 615 1158, Proj. 4159, Task 415906
AL TDR64 275

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-600 714.

Descriptors: (*Molecular electronics, Photoengraving), (*Photoengraving, Molecular electronics), Metal plates, Photographic plates, Positioning devices (Machinery), Servomechanisms, Automation, Optical equipment, Cameras, Programming (Computers), Microscopes.

High-quality photographic masks are sought for use in delineating areas for the diffusions and interconnection patterns in the fabrication of functional electronic blocks for electronic circuits. Masking requirements which are considered to be consistent with the state-of-the-art are enumerated. Maskmaker specifications consistent with these requirements are listed. Several systems for making masks by the Microscribe approach are specified and are described. System approach, electrical, optical and mechanical design, and testing of the experimental model are described in detail. Methods of programming and error checking are also described. Optical problems associated with micro-imagery, as applicable to the present machine, have been investigated. A microscope objective was specified on the basis of these investigations. Optical tests have verified this selection and have also verified the required exposure time. Preliminary investigations indicate that the multiple image technique is feasible. Performance of the present machine has been checked by running a series of tests tapes through the machine and analyzing the results obtained on photographic plates.

25. Physics

AD-608 919 Div. 25, 8, 14, 30
OTS Prices: HC $2.00/MF $0.50

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
A SOLID-STATE SELF-SCANNING DISPLAY PANEL.
Final rept. for 16 Apr 63-15 Apr 64,
by Stephen Yando. Oct 64, 42p GTEL-TR-64-208.13
Contract AF30 602 3050, Proj. 5578, Task 557803
RADC TDR64 335

Unclassified report

Descriptors: (*Display systems, Electroluminescence), (*Piezoelectric crystals, Display systems), (*Electroluminescence, Piezoelectric crystals), Adaptive control systems, Circuits, Transducers, Solid-state physics, Test equipment (electronics), Phosphorescent materials, Ceramic materials, Composite materials.

The solid-state self-scanning display device described in this report consists basically of a piezoelectric ceramic plate which controls the point-by-point excitation of an electroluminescent phosphor layer over the plate. An investigation has been carried out for the optimization of materials and structures employed in the panel. This investigation included the electroluminescent phosphor layer, a nonlinear resistor layer used to obtain high contrast and the piezoelectric ceramic distributor with its input transducer. Techniques for coupling the different planar display components are described. An experimental model of the display panel employing the results of this investigation was constructed. Contract specifications for the model have been met or exceeded. A drive circuit for testing the display panel is described in detail. A recommendation for significantly improving the device is presented. (Author)

AD-608 921 Div. 25
OTS Prices: HC $1.00/MF $0.50

Philco Corp., Blue Bell Pa.
COHERENT OPTICAL PARAMETRIC TECHNIQUES.
Quarterly rept. no. 1,
by C. Wang. Oct 64, 22p
Contract AF30 602 3364, Proj. 4506, Task 450608
RADC TDR64 386

Unclassified report

Descriptors: (*Lasers, Parametric amplifiers), (*Parametric amplifiers, Lasers), Ruby, Gases, Helium, Neon, Hydrogen, Physics, Electromagnetic waves, Optics, Equations.

The theoretical and experimental aspects of optical parametric amplification involving three waves were studied. Major achievements during the reporting quarter included (a) successful operation of high power, nearly single-moded ruby lasers, and (b) observation of parametric interaction among Raman-shifted lines. An attempt is being made to observe parametric amplification of the 6328 A radiation from He-Ne gas laser, using the second harmonic radiation of ruby as the pump. (Author)

AD-608 932 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

Illinois Univ., Urbana.
STRESS DISTRIBUTION IN A NOTCHED SEMI-INFINITE PLATE,
by D. Shadman. Aug 64, 50p TAM-267
Contract Nonr294702X, Proj. 62R05 19A

Unclassified report

Descriptors: (*Stresses, Flat plate models), (*Fracture (Mechanics), Stresses), Elasticity, Loading (Mechanics), Force (Mechanics), Numerical analysis, Factor analysis, Statistical data, Distribution, Tables.

The problem treated is that of determination of stresses in a semi-infinite elastic half-plate with a notch of depth unity perpendicular to the straight edge. The half-plane is loaded symmetrically with two isolated forces acting at points inside the semi-infinite body. The solution to this problem is obtained by superposition of stresses due to (a) complete elastic half-plane loaded with two isolated forces, located symmetrically with respect to a line perpendicular to the straight edge, and (b) notched elastic half-plane with prescribed stresses acting on the boundary of the notch. The prescribed tractions on the notch are obtained from the solution of part (a). The numerical values of the stress intensity factors for 62 different locations of the isolated forces, in the half plane, are determined. These results generally indicate a sharp change in the stress intensity factors when the forces act at points close to the crack. The change of the stress intensity factor is small when the forces act at points several lengths removed from the crack. (Author)

AD-608 937 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Philadelphia, Pa.
VOLTAGE DISTRIBUTION, IONIZATION, AND ENERGY BALANCE IN THE CATHODE REGION OF AN ARC.
Interim technical rept. for Mar 63-Apr 64,
by T. H. Lee, Allan Greenwood, W. D. Breingan, and H. P. Fullerton. Oct 64, 52p
Contract AF33 657 8206 S1, Proj. 7063, Task 7063 03
ARL 64 152

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electric arcs, Cathodes (Electron tubes)), (*Cathodes (Electron tubes), Electric arcs), (*Space charges, Cathodes (Electron tubes)), Electrical properties, Transport properties, Thermoelectricity, Gas ionization, Programming (Computers), Ionization potentials, Integral equations, Ions, Mathematical models, Argon, Gas discharges, Electromagnetic waves, Thermal conductivity, Electrical conductance.

Formulations are given for the several sub-regions of the model proposed in ARL 63-163 (AD-418 764) for the cathode region of an argon arc. It is shown that it is necessary to include a new transition region in which the ordinary transport theory cannot be applied. Limiting characteristics for this new region are worked out. Numerical results are obtained for that part of the arc between the cathode and the contraction region. These are presented in the form of profiles of voltage, particle concentration, and temperature. The computer program for the contraction region is described in detail. It is demonstrated that the cathode drop is about six or seven volts, which accords with experimental observation. This does not all appear across a positive ion space charge sheath, but includes adjacent parts of the discharge including the ionization region. It is further shown that it is possible to produce the necessary ionization to support the arc although the ionization potential of the gas greatly exceeds the cathode drop. The calculations require data such as the electrical and thermal conductivity in multicomponent gas mixtures in which the species are at different temperatures. Such data was not available and is calculated in the report. (Author)

AD-608 938 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Philadelphia, Pa.
ELECTRIC ARCS IN TURBULENT FLOWS.
Interim rept. for Mar 63-Apr 64,
by Gerhard Frind. Sep 64, 38p
Contract AF33 657 8206, Proj. 7063, Task 7063 03
ARL 64 148
Unclassified report

Descriptors: (*Turbulence, Electric arcs), (*Electric arcs, Turbulence), Laminar flow, Cascade structures, Pipes, Gas flow, Voltage, Test methods, Plasma medium, Gas generating systems, Test equipment, Design, Power supplies, Photographics analysis, Temperature, Energy conversion, Equations.

Experiments are made with the aim to find characteristic differences between electrical arcs in laminar and turbulent flows. To start with the simplest conditions, it is attempted to burn arcs in the fully developed flow region of a flow tube. The tube is 37 cm long and has a 1 cm bore. It is made of electrically insulated copper discs (cascade-chamber) or of quartz glass and is operated with 25 amp DC for durations of 1/2 sec. Highly preheated carbon-dioxide gas of 3.1 atm. pressure from a plasma generator is injected into the tube to shorten the thermal entrance length. Measurements of the electrical potential along the flow tube show that the electrical gradient reaches asymptotically constant values at the end of the flow tube, even for flow velocities as high as 250 m/sec. At these velocities the gradient is about twice as large as compared to gradients for arcs with speeds smaller than 20 m/sec. High speed photography with exposure times of 2 micro sec. reveals that the low velocity arcs are in a quiet, apparently laminar mode, whereas the high velocity arcs are moving violently and with apparent randomness. The flow velocity of the high speed arcs still increases considerably at the end of the flow tube. This suggests that still larger l/d values must be used to reach fully developed flow. (Author)

AD-608 946 Div. 25
OTS Prices: HC $2.00/MF $0.50

General Mills, Inc., Minneapolis, Minn.
SPUTTERING.
Annual rept. for 1 Nov 63-31 Oct 64,
by R. V. Stuart and G. K. Wehner. 24 Nov 64, 48p
GMI-2656
Contract Nonr158915, Proj. 85037
Unclassified report

Subcontract to Litton Systems, Inc., Minneapolis, Minn.
See also AD-267 458, AD-291 667.

Descriptors: (*Ion bombardment, Crystal substructure), (*Crystal substructure, Ion bombardment), (*Crystal structure, Ion bombardment), (*Atomic spectroscopy, Crystals), Ejection, Single crystals, Ions, Atoms, Plasma physics, Spectroscopy, Krypton, Beryllium, Silver, Uranium.

Energy distributions have been determined for atoms sputtered from polycrystalline targets for twenty-three different target materials. Ejection energies are found to depend strongly on the mass of the target atom. Most probable and average ejection energies plotted as a function of the atomic number of the target material show a periodicity in that within each period these energies tend to decrease with increased filling of the d-shell. Average ejection energies range from 6.8 eV for Be to 45 eV for U. Average ejection velocities group mostly around 600,000 cm/sec and range from a high of 1,100,000 cm/sec for Be to a low of 390,000 cm/sec for Ag. (Author)

AD-608 953 Div. 25, 8
OTS Prices: HC $4.00/MF $0.75

Technical Research Group, Melville, N. Y.
RESEARCH ON PROPERTIES OF LASER DEVICES,
by S. Barone, V. Chandler, R. Daly, G. Gould and G. Grosof. 10 Jun 61, 105p TRG-134-TR-5
Contract AF49 638 673, ARPA Order 6 58, Task 12
Unclassified report

See also AD-420 330.

Descriptors: (*Lasers, Oscillation), Cesium, Vapors, Light, Pumping (Electronics), Fluorescence, Gas discharges, Ruby, Calcium compounds, Tungstates, Impurities, Rare earth elements, Interferometers, Optical properties, Single crystals, Crystal growth, Europium, Dysprosium, Terbium, Praseodymium, Excitation, Atomic energy levels, Electron transitions, Dissociation, Krypton, Resonators.

Experiments were performed to detect LASER oscillations at 3 microns and at 7 microns from cesium vapor optically pumped with light from helium discharge lamps. No oscillations were observed. Fluorescence measurements have led to the construction of an improved system. Work was carried out on several possible LASER media utilizing collisions of the second kind in a gas discharge. Studies of the spacial and temporal behavior of the ruby (R line) LASER was investigated and crystal boules of calcium tungstate containing various concentrations of rare-earth ions were grown. Oscillation was attempted, unsuccessfully in each of these schemes. Studies of crystal perfection indicate that the internal quality of these crystals is not yet adequate. Two new forms of the Fabry-Perot interferometer have been constructed, which are superior in adjustment tolerances. Several aspects of the optical behavior of Fabry-Perot interferometers which are of importance for the understanding of F. P. LASERs have been studied theoretically. (Author)

AD-608 954 Div. 25, 8
OTS Prices: HC $5.00/MF $1.00

Technical Research Group, Melville, N. Y.
RESEARCH ON PROPERTIES OF LASER DEVICES,
by R. Daly, G. Grosof, B. Hammond, S. Jacobs, and R. Martin. 19 Jan 62, 170p TRG-134-TR-6
Contract AF49 638 673, ARPA Order 6 58, Task 12
Unclassified report

Descriptors: (*Lasers, Optical properties), Theory, Design, Amplifiers, Oscillation, Excitation, Modulation, Crystal growth, Vapors, Pumping (Electronics), Rare earth elements, Interferometers, Gas discharges, Diffraction analysis, Resonators, Materials, Krypton, Xenon, Helium, Neon, Zinc, Cesium, Chlorides, Tungstates, Dysprosium, Mercury, Ruby, Oscillators, Light.

LASER amplification corresponding to a gain of 6% per meter was measured at 3 microns in cesium vapor optically pumped with light from a helium discharge lamp. Amplification and oscillation at 1 microns were measured in a helium-neon system based on collisions of the second kind. The amplification parameters, when optimized resulted in a gain of 9% per meter. Krypton-xenon and zinc vapor are other media utilizing collisions of the second kind which were investigated. Crystals of calcium tungstate containing either Dy(3+) or Nd(3+) were grown. LASER oscillation was observed from two crystals of CaWO4:Nd. Direct amplification of the output of a ruby oscillator in a

second ruby rod was demonstrated. Three methods of achieving single pulse output from ruby oscillators are described. A pulse of 2,000,000 watts peak power was achieved by one method. A broadband emission was discovered in normally pink ruby (.04% Cr by weight). It accounts for 30% of the total emission, making the quantum efficiency unity. A theoretical analysis of the properties fo cube corner interferometers has been experimentally verified. (Author)

AD-608 956 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

George Washington Univ., Washington, D. C. School of Engineering and Applied Science.
THERMAL NETWORK PORTS IN TRANSDUCERS.
Rept. no. 2,
by Louis de Pian and D. K. Anand. 1 Dec 64, 16p
Contract Nonr761 09, Proj. NR185 550
Unclassified report

Descriptors: (*Networks, Transducers), (*Transducers, Thermoelectricity), (*Thermoelectricity, Gates (Circuits)), Thermodynamics, Equations of state, Entropy, Thermal conductivity, Theory, Equations, Differential equations, Circuits, Energy conversion, Electromechanical converters.

The purpose of this report is to investigate the feasibility of taking the thermal energy exchange into account when dealing with transducers. An electromechanical transducer has two ports: an electrical port through which electrical energy can be given to or taken away from the transducer, and a mechanical port for giving or taking away mechanical energy. Invariably, in these energy transfers, heat or thermal energy comes into play and often plays an important role. The question this report is attempting to answer is whether or not a third port may be introduced, a thermal port, through which thermal energy can be given to or taken away from the transducer.

AD-608 965 Div. 25
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Pittsburgh, Pa.
GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS.
Quarterly technical rept. no. 5.
1964 , 6p
Contract AF49 638 1245
Unclassified report

See also AD-603 254.

Descriptors: (*Rare earth compounds, Single crystals), (*Single crystals, Rare earth compounds), (*Crystal growth, Rare earth compounds), Crystal growth, Electrical conductance, Europium compounds, Sulfides, Lanthanum, Impurities, Chromium compounds, Bromides, Silicon, Transport properties, Terbium, Gadolinium alloys, Terbium alloys, Yttrium alloys, Films, Calcium compounds, Fluorides, Solid solutions, Transition temperature, Crystal structure, Magnetism, Tellurium alloys, Chromium alloys, Antimony alloys, Manganese alloys.

Experimental work was continued in three areas, namely, crystal growth, electrical conductivities of La-doped EuS, and magnetic structure of CrTe sub x Sb sub (1-x). A new approach was initiated to the growth of EuS crystals from the vapor phase. Similar attempts were also made for Si-doped CrBr3. The strain-anneal method has given encouraging results for growing large crystals of rare earth metals and alloys. The electrical properties of La-doped compounds of EuS were further studied and d.c. measurements were begun on thin film samples of these compounds. Magnetic structures in the CrTe-CrSb system have been discussed and compared with those in the MnSb-CrSb system.

AD-608 974 Div. 25
OTS Prices: HC $1.00/MF $0.50

Thermo-Kinetic Corp., Tucson, Ariz.
THE ARTIFICIAL GROWTH OF SINGLE CRYSTALS OF CALCITE (CaCO3) WITH A HIGH DEGREE OF IMPURITY CONTROL.
Final rept. for 1 Jul 63-30 Jun 64,
by Archie J. Deutschman, Jr., and James W. Berry.
Sep 64, 15p
Contract AF30 602 3137, Proj. DU63 41
RADC TDR64 344
Unclassified report

Descriptors: (*Calcite, Crystal growth), Calcium compounds, Carbonates, Nucleation, Single crystals, Crystal lattice defects, Direct current, Electric fields, Resonance, Control, Ammonium compounds, Nitrates.

Doping of calcite by DC field sweeping resulted in low but significant levels of cationic contaminants ranging from 10-80 ppm. Hydrothermal growth of calcite was effected in a 12% aqueous ammonium nitrate system below 100C. Spontaneously nucleated growth predominates and small doped crystals of calcite can be prepared. (Author)

AD-608 979 Div. 25, 14, 17, 26
OTS Prices: HC $2.00/MF $0.50

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE EFFECT OF STRESS DISTRIBUTION ON THE FATIGUE BEHAVIOR OF ADHESIVE BONDED JOINTS.
Final rept. for Mar 59-Jul 61,
by D. Y. Wang. Jul 63, 37p
Proj. 7351, Task 735106
ASD TDR63 93; N63 21426
Unclassified report

Descriptors: (*Bonded joints, Stresses), (*Fatigue (Mechanics), Bonded joints), (*Aluminum alloys, Bonded joints), Adhesives, Joints, Failure (Mechanics), Rubber adhesives, Nitrile rubber, Phenolic plastics, Vinyl plastics, Sheets.

A study was made of the fatigue behavior of three types of 2024-T3 aluminum alloy adhesive bonded joints, single lap-joint, scarf-joint and butt-joint, bonded with two kinds of adhesives, a vinyl-phenolic type-FM 47 and a nitride rubber-phenolic type-Metlbond 4021. It was found that the different modes of fatigue failures of the single lap-joints, that is, sheet metal failure, and adhesive bonding failure, were caused by the different stress components in the joint. The influence of the variation of stress distribution caused by the difference in mechanical properties of the adhesive, geometry of the joints, and the type of loading on fatigue strength of the adhesive bonded joints, were analyzed. (Author)

AD-608 986 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Carborundum Co., Niagara Falls, N. Y.
CRYSTAL CHEMISTRY OF ALPHA BORON DERIVATIVES.
Technical rept. no. 6,

by J. Economy, V. I. Matkovich, and R. F. Giese, Jr.
Nov 64, 22p
Contract Nonr407500, Proj. NR056 449
Unclassified report

Rept. on Interstitial Compounds of Boron and Transition Metals.

Descriptors: (*Boron compounds, Crystal structure), (*Crystal structure, Chemical analysis), Molecular weight, Atomic properties, Carbides, Phosphides, Arsenides, Aluminum compounds, Silicides, Sulfides, Borides, Transition elements, Crystal lattices, Chemical reactions.

Assignment of stoichiometry to interstitial compounds is discussed. It is shown that multiple stoichiometries can occur within the same structural framework where more than one type of interstitial opening is available. These principles are used to clarify the confusion which currently exists in the isotypic series of interstitial compounds derived from alpha boron. With respect to occupancy of interstitial sites three distinct stoichiometries can exist in this isotypic group; namely, B12 X2Y (B12X3), B12X2 and B12X. Data are presented on (1) a new form of boron carbide (B12C2), (2) a new alpha boron derivative containing interstitial aluminum (B12C2A1), (3) identification and differentiation of two boron subphosphides (B12P2 and B13P2), (4) preparation of boron subarsenide, and (5) relationship between metal dodecaborides and alpha boron derivatives. (Author)

AD-608 988 Div. 25
OTS Prices: HC $3.00/MF $0.75

Microwave Lab., Stanford Univ., Calif.
SPACE-CHARGE WAVES IN AN ACCELERATED PARALLEL-FLOW ELECTRON BEAM IN A CONSTANT MAGNETIC FIELD.
Interim rept.,
by Bas Hoeks. Oct 64, 63p ML-1205
Contract AF30 602 2575, Proj. 5573, Task 557303
RADC TDR64 404
Unclassified report

Descriptors: (*Space charges, Electron beams), (*Electron beams, Noise (Radio)), Magnetic fields, Electrons, Electron guns, Electric fields, Perturbation theory, Transformations, Differential equations, Boundary valve problems, Series.

This report considers the small-perturbed electron motions in an accelerated (space charge limited) cylindrical parallel flow electron beam to establish whether noise fluctuations will grow or decay as a function of distance and magnetic field. Approximate solutions of the resulting second order differential equations are presented in the form of both first order WKB solutions and asymptotic series, the WKB form having the advantage of being a fairly good normal mode representation. Solutions show magnitude of perturbed radial electron displacement will increase indefinitely for no magnetic field and will reach an asymptotic value at a certain distance from the cathode, with magnetic field, the stronger of the field, the shorter this distance. The transverse and quasi-static electric fields decay in both cases. (Author)

AD-608 989 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Tyco Labs., Inc., Waltham, Mass.
STUDY OF SURFACE STATES IN SEMICONDUCTORS.
Quarterly interim rept. no. 4, 1 Apr-30 Jun 64,
by G. Rupprecht, J. Gilbert, and P. H. Smakula.
Oct 64, 20p
Contract AF30 602 3157, Proj. 5519, Task 551902
RADC TDR64 346
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Semiconductors, Surface properties), Silicon, Crystals, Heat of activation, Silicon compounds, Dioxides, Films, Oxidation, Atomic energy levels, Density, Electron capture, Electron transitions, Electrical conductance.

Using the pulsed field effect, surface state studies were conducted on silicon surfaces oxidized by two methods, thermal oxidation in steam and anodic oxidation. The n-type samples which were thermally oxidized showed an activation energy of 0.51 eV, capture cross section of 3 x 10 to the 16th power, and density of 10 to the 10th power 1 sq cm. The anodically oxidized samples showed no evidence of surface states. (Author)

AD-608 995 Div. 25
OTS Prices: HC $4.00/MF $1.00

RAND Corp., Santa Monica, Calif.
ABSTRACTS OF THE PAPERS PRESENTED AT THE ALL-UNION CONFERENCE ON HEAT AND MASS TRANSFER (2ND), MINSK, USSR, MAY 5-9, 1964,
comp. by Joy B. Gazley and Carl Gazley, Jr. 1964,
143p P-3023
TT 65 60424
Unclassified report

Consists of edited English abstracts of papers presented at Vsesoyuznoe Soveshchanie po Teplo- i Masso-obmenu (no. 2) Minsk, 5-9 May 64.

Descriptors: (*Heat transfer, Symposia), (*Transport properties, Symposia), Thermodynamics, Abstracting, Chemical reactions, Chemical engineering, Simulation, Phase studies, Mathematical analysis, Abstracting, USSR.

Contents: Convective heat transfer in single-phase media; Heat and mass transfer for the interaction of bodies with liquid and gas flows; Heat and mass transfer with phase changes; Heat and mass transfer with chemical changes and applications in chemical engineering; Heat and mass transfer in dispersed media (Fluidized beds, two-phase flows); Heat and mass transfer in drying processes; Analytical methods for solving heat- and mass-transfer problems; Calculation methods and simulation of heat- and mass-transfer processes; Thermal properties of various materials heat agents and methods of their determination.

AD-609 016 Div. 25
OTS Prices: HC $4.00/MF $1.00

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
THEORY OF SEMICONDUCTOR-TO-METAL TRANSITIONS,
Technical rept.,
by David Adler. 26 Aug 64, 172p
Contract SD88
ARPA 12
Unclassified report

Descriptors: (*Semiconductors, Electron transitions), (*Metals, Electron transitions), (*Electron transitions, Solid state physics), Theory, Crystal structure,

Atomic energy levels, Electrical conductance, Electron density, Chemical bonds, Antiferromagnetism, Oxides, Titanium, Vanadium, Statistical distributions, Thermodynamics, Quantum mechanics, Differential equations, Spin, Alloys, Temperature, Operators (Mathematics).

Several materials undergo transitions from a semiconducting to a metallic state at a critical temperature. Previous theoretical attempts to understand such transitions have been generally qualitative and have not been able to account for all the specific experimental results. In this work, an explanation of semiconductor-to-metal transitions is presented using a band model. It is shown thermodynamically that the energy gap of a semiconductor closes down significantly with the number of excited carriers if the gap has a large pressure coefficient, as is found in several of these materials. This shrinkage of the energy gap is due to explicit variation of the crystalline volume. There may also be a constant volume carrier concentration dependence of the gap, which cannot be evaluated thermodynamically. The experimental results dealing with the crystals which exhibit semiconductor-to-metal transitions are presented, and the predictions of the theory are tested. Very good agreement is obtained. (Author)

AD-609 017 Div. 25
OTS Prices: HC $2.00/MF $0.50

Illinois Univ., Urbana.
THE ROLE OF STRAIN IN THE NUCLEATION OF SOLID STATE TRANSFORMATIONS.
Final rept. for 1 Jun 61-1 Sep 64,
by C. A. Wert, C. J. Altstetter, J. O. Nelson, and M. S. Rashid. 1 Oct 64, 33p
Grant DA ARO D31 124G73, Proj. P3172MC
Unclassified report

Descriptors: (*Strain (Mechanics), Phase studies), (*Transformations, Nucleation), (*Solid state physics, Transformations), Single crystals, Crystals, Crystal lattices, Crystal structure, Metallography, X-ray diffraction analysis, Cobalt, Cobalt alloys Lanthanum, Cerium, Martensite, Iron, Iron alloys, Chromium alloys.

The allotropic transformations in iron, cobalt, cerium, and lanthanum were studied with the objective of establishing the factors which are influential in the initiation and propagation of the transformation. From a study of zone-refined iron it was concluded that interstitial solutes are not essential for the artensitic transformation of iron. The FCC-HCP martensitic transformation was studied in whiskers bulk single crystals and polycrystalline specimens of cobalt. From the measured effect of stress on the transformation it was concluded that the transformation was very defect sensitive and the habit plane was not controlled by a critical resolved shear stress criterion. In cerium, both the FCC-FCC and FCC-HCP transformations were studied in polycrystalline specimens. The FCC-HCP transformation in lanthanum was found to occur isothermally, in contrast to the other allotropic transformations studied in this wor. (Author)

AD-609 021 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
GENERAL MODEL FOR A SEMI-INFINITE TRANSMISSION LINE WITH MUTUAL INDUCTANCE,
by Richard H. Huddlestone. 2 Oct 59, 20p
STL-TR-59-0000-00786
Contract AF04 647 309
Unclassified report

Descriptors: (*Transmission lines, Mathematical models), Inductance, Magnetic fields, Boundary value problems, Partial differential equations, Integral equations, Functions, Circuits.

Equations are formulated for a transmission line in which mutual inductance effects are important. For a semi-infinite line the equations are of a generalized Wiener-Hopf type. The techniques necessary to solve problems associated with such a line are developed. The principal result of the paper is an integral representation for the solution of the equations corresponding to prescribed initial conditions and a given terminating impedance. (Author)

AD-609 023 Div. 25, 8
OTS Prices: HC $4.00/MF $0.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
ANALYSIS OF ELECTRON BEAM-PLASMA SYSTEMS, Technical rept.,
by Philip E. Serafim. 31 Jul 64, 101p RLE-423
Contract DA36 039AMC03200E; Grant DA SIG36 039 61G14
Unclassified report

Descriptors: (*Electron beams Plasma medium), (*Plasma medium, Electron beams), Metals, Waveguides, Electric fields, Electromagnetic waves, Dielectric properties, Coupling circuits, Velocity, Matrix algebra, Electromagnetism, Tensor analysis, Partial differential equations Field theory Variance Boundary value problems.

The interaction between an electron beam and a plasma in metallic waveguides and in the presence of an external longitudinal magnetostatic field is analyzed. Plasma ions and electrons are considered. The treatment refers to a temperate plasma. The electron beam is rectilinear and has a well-defined unperturbed velocity. This velocity is assumed to be uniform over the waveguide cross section. Modifications for nonuniform velocity are also presented. The treatment is valid for slow and fast waves and for relativistic beam velocities. In the first part an exact analysis is made of the beam-plasma wavegude based on the linearized Maxwell equations and the Lorentz force equation. The 'operator' dielectric tensor description of the beam-plasma medium is introduced. The properties of this tensor are examined and the boundary conditions are formulated in terms of the elements of this tensor. The field analysis for the beam-plasma system is made, and the dispersion equation and the determinantal equations are derived from the satisfaction of the boundary conditions. Cutoffs resonances, slow waves, and the quasi-static approximation are studied. Conservation principles for our specific beam-plasma system are formulated, and Chorney's bidirectional theorem is extended to our medium. Some variational theorems for this system are also studied. (Author)

AD-609 036 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
TRANSMITTANCE OF OPTICAL MATERIALS AT HIGH TEMPERATURES IN THE 1- TO 12-MICRON RANGE.
Rept. for Jun 61-Jul 63,
by D. T. Gillespie, A. L. Olsen, and L. W. Nichols.
Oct 64, 33p
NOTS TP3586; NAVWEPS 8558
Unclassified report

Presented at the 49th Annual Meeting of the Optical Society of America, New York, N. Y., 8 Oct 64.

Descriptors: (*Infrared radiation, Optical materials), (*Dielectrics, Wave transmission), (*Semiconductors, Wave transmission), (*Optical materials, Wave transmission), Glass, Quartz, Calcium compounds, Aluminates, Sapphires, Silver compounds, Chlorides, Sodium compounds, Silicon, Germanium, Heat-resistant materials, Spectrophotometers, Temperature control.

Transmittance measurements of optical materials were made at 25, 100, 200, 300, and 400C in the 1- to 12-micron range. A continuous proportioning temperature control system was designed to establish rapidly and to maintain precisely a given temperature level in specially constructed high-temperature cells. The following materials, which are dielectrics and semiconductors of potential use as windows and IRDOMES in optical systems at high temperatures, were selected: Corning glasses 0160, 8363, and 7905; water-free quartz; Barr and Stroud calcium aluminate, 37A and 39A; sapphire; IRTRAN-1 and IRTRAN-2; silver chloride; sodium chloride; silicon; and germanium. The results of the investigation are presented as transmittance vs. wavelength at the five temperatures. The transmittance of dielectrics remains relatively unaffected up to 400C; optical materials of this class are restricted in use at the higher temperatures only in the shift of the long wavelength transmittance limit. With the semiconductors silicon and germanium, the absorption edge is shifted to longer wavelengths and the over-all transmittance is greatly reduced with increase of temperature.

AD-609 037 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
APPARATUS FOR THE DIRECT RECORDING OF ULTRASONIC ATTENUATION IN SOLIDS,
by R. L. Hagman, R. S. Krogstad, and R. W. Moss.
Jun 64, 17p D1-82-0357 Unclassified report

Also available from the authors.

Descriptors: (*Ultrasonic radiation, Solids), (*Acoustics, Measuring devices (Electrical and Electronic)), (*Measuring devices (Electrical and Electronic), Acoustics), Mechanical waves, Sound, Single crystals, Strontium compounds, Titanates, Copper, Silver, Gold, Attenuation, Measurement, Electronic recording system, Radiofrequency pulses, Special functions (Mathematical).

Effort is devoted to the measurement of acoustic losses in solids, primarily single crystals, at ultrasonic frequencies. In this type of experiment a pulse of r-f energy excites a quartz transducer bonded to the sample which in turn sends a pulse of ultrasound through the sample. The acoustic pulse is reflected from the sample end, travels back to the transducer and the reciprocal effect occurs. As a basic unit for this measurement the Sperry Ultrasonic Attenuation Comparator is used. This unit is a combination transmitter-receiver capable of delivering rf pulses over the frequency range 10-200 mc, containing a 60 mc heterodyne receiver with 8 mc bandwidth, and a calibrated exponential wave generator for attenuation measurements. The attenuation is essentially the logarithm of the ratio of the amplitudes of any two echoes, the procedure is to choose two convenient ones, detect their peaks, logarithmically amplify these, and then take the difference which is plotted on the x-y plotter against the suitable parameter.

AD-609 052 Div. 25
OTS Prices: HC $1.00/MF $0.50

Rutgers Univ., New Brunswick, N. J.
SHEAR WAVE ATTENUATION IN SUPERCONDUCTORS.
Technical rept.,
by Toshihiko Tsuneto. 30 Nov 64, 11p
Contract Nonr40413, Proj. NR018 104
Unclassified report

Supported in part by the National Science Foundation.

Descriptors: (*Superconductors, Shear stresses), (*Shear stresses, Superconductors), (*Attenuation, Shear stresses), Drag, Metals, Sound, Theory, Statistical functions, Mathematical analysis, Vector analysis, Green's function, Hamiltonian.

A general theory of the sound wave attenuation in metals is given in terms of the correlation function and is applied to the discussion of the shear wave attenuation in superconductors with the spherical Fermi surface. It is shown that the residual attenuation in the superconducting state is due to the collision drag effect. The ratio of shear wave attenuation constant in the superconducting state to that in the normal state is calculated in the two limits $ql>>1$ and $<<1$, where q is the wave number of the sound wave and l the electronic mean free path. The results confirm the theory of Claiborn and Morse (IBM Develop. 6:58 (1962).

AD-609 106 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

Brown Univ., Providence, R. I.
THE INFLUENCE OF VISCOSITY ON SHOCK WAVES STRUCTURED BY RADIATION,
by Ira M. Cohen and Joseph H. Clarke. Oct 64, 19p
Contract Nonr56235
Unclassified report

Supported by the Advanced Research Projects Agency, Washington, D. C.

Descriptors: (*Hypersonic flow, Heat transfer), (*Shock waves, Viscosity), (*Viscosity, Shock waves), Equations of state, Thermal radiation, Numerical analysis, Hypersonic flow, Thermal conductivity, Transport properties, Specific heat, Absorption.

The structure of normal shock waves with radiation, viscosity, and thermal conductivity is treated in the physically relevant limit of large radiation absorption length (or photon mean free path) compared to molecular transport length (or molecular mean free path). If radiation is not too intense or the shock too weak, then a viscous, conducting shock is found embedded in a radiation structured inviscid shock. Under very general conditions, this viscous 'shock within a shock' has precisely the same structure as a classical (radiationless) viscous, conducting shock when reinterpreted as to initial and final states, to lowest order in an expansion based on the ratio of the two transport lengths. This lowest order solution is no longer trivial when the optically thin region considered is embedded in a much thicker region. The next order corresponds to the usual optically thin case but the well known formula (accounting for emission but not absorption by the gas) does not apply; the divergence of the radiation flux is actually given by the emission minus absorption of the radiation from the outer region. Since the relative importance of these two effects changes markedly through the inner viscous shock, the usual formula is meaningless here. (Author)

AD-609 120 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Philco Corp., Blue Bell, Pa.
SOLID STATE APPLICATION STUDY.
Final rept.,

by S. T. Fisher and G. Lucovsky. Oct 64, 63p
Philco B-002
Contract AF30 602 3037, Proj. 5573, Task 557303
RADC TDR64 375

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Semiconductors, Plasma oscillations), (*Solid state physics, Electromagnetic waves), (*Plasma physics, Semiconductor devices), Quantum mechanics, Magnetic fields, Tensor analysis, Integral equations, Crystal oscillators, Crystal lattices, Field theory, Dielectrics, Indium alloys, Antimonides, Statistical functions, Millimeter waves, Fourier analysis, Partial differential equations, Photons, Phonons, Electrons, Masers, Damping, Hall effect, Conductivity, Equations, Integral equations, Excitation.

The objective of this contract was to conduct a theoretical and experimental investigation of the plasma-like properties of the charge carriers in solid-state materials in order to determine the feasibility of utilizing this pseudo-plasma for amplification and generation of electromagnetic energy. Also studied in this investigation was the feasibility of obtaining radiative transitions between excited states of impurity atoms in germanium and silicon. (Author)

AD-609 129 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

North Carolina Univ., Chapel Hill.
ELECTRICAL AND OPTICAL PROPERTIES OF ORGANIC SOLIDS.
Final rept.,
by R. C. Jarnagin. Dec 64, 9p
Grant DA ARO D31 124G435, Proj. 3034C
AROD 3034 9

Unclassified report

Descriptors: (*Aromatic compounds, Physical properties), Electrical properties, Optical properties, Electrolytes, Fluorescence, Crystal structure, Single crystals, Photons, Absorption, Gases, Anisotropy, Electrons, Photochemistry, Molecules.

The crystalline phase imparts to optically stimulated molecular transitions frequency shifts, intensity changes, and other peculiar effects. These effects have increasingly been recognized as arising from significant and characteristic behavior of weakly interacting molecules. The paper discusses those phenomena surrounding the injection of charge into molecular crystals and the behavior of charge and energy in its migration and degradation within the bulk of a molecular crystal.

AD-609 136 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BIBLIOGRAPHY OF PUBLICATIONS ON THE SUBJECT OF HEAT AND MASS EXCHANGE,
by R. A. Dolinskaya. 27 Nov 64, 21p
FTD TT64 395; TT 65 60431

Unclassified report

Unedited rough draft trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1963, v. 6, no. 12, p. 127-134.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transport properties, Bibliographies), (*Heat transfer, Bibliographies), (*Bibliographies, Transport properties), Mathematical analysis, Thermodynamics, Phase studies, High-temperature research, Magnetohydrodynamics, Design, Thermal conductivity, Driers (Apparatus), Nuclear reactors, USSR.

Contents: Mathematical analytic methods; Thermodynamics; Experimental methods; Processes with phase conversion, chemical conversion, and super high speeds; Drying processes; Thermophysical and thermodynamic characteristics of various materials, heat conductors and methods of determining them; physics of high temperature processes and magnetic hydrodynamics; Processes in nuclear reactors; Design processes and apparatus.

AD-609 154 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
JOURNAL OF PHYSICS, 1963, VOL. 19, NO. 5: SELECTED ARTICLES,
by Pang-Hsin Chou. 23 Nov 64, 40p
FTD TT64 371; TT 65 60454

Unclassified report

Edited trans. of Wu Li Hsueh Pao (Chinese People's Republic) 1963, v. 19, no. 5, p. 285-296.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Crystal structure, Molybdenum), (*Molybdenum, Crystal structure), (*Signal crystals, Molybdenum), Crystal lattice defects, Crystal lattices, Single crystals, Crystal growth, Metallic crystals, Shear stresses, Deformation, Ductility, Microstructure, Metallography.

Contents: A study of the plastic deformation of single crystals of molybdenum, Cold-rolled and recrystallization textures of molybdenum single crystals.

AD-609 160 Div. 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
HTE SIMILARITY OF NON-STATIONARY HEAT TRANSFER OF SOLIDS UNDER IDENTICAL CONDITIONS,
by E. V. Kudryavtsev and N. V. Shumakov.
28 Oct 64, 13p
RSIC 314; TT 65 60460

Unclassified report

Trans. of Moskovskii Institut Inzhenerov Zheleznodorozhnogo Transporta. Trudy (USSR) 1961, v. 139, p. 122-130.

Descriptors: (*Heat transfer, Solids), (*Solids, Heat transfer), Boundary value problems, Equations of state, Heat transfer coefficients, Thermal conductivity, Thermal properties, Temperature, Heat, Pressure, Thermodynamics.

An analysis was made of the investigative results of unsteady heat exchange in solid bodies under identical conditions of practical importance. These investigations allow us to formulate a fourth requirement of identity of temperature fields in bodies heated (cooled) in identical conditions, and they further allow us to formulate a possibility of transfer from boundary conditions of a model to the boundary conditions of nature in any case where the identity of temperature fields takes place, and, in more common cases, where the identity of fields is

not present. As objects for investigation, measuring bodies q of the calorimeters were used. A measuring body represents a cylinder with one heat exchange surface (base at x = R), the remaining body surface being heat-insulated in such a way that it allows the measuring body to be regarded as a cylindrical cutout from half of an infinite plate (0 < x > R). Experimental results were processed according to the method of average temperatures and according to the method of consecutive intervals.

AD-609 168 Div. 25, 2
OTS Prices: HC $3.00/MF $0.75

General Atomic Div., General Dynamics Corp., San Diego, Calif.
MEASUREMENT OF ATOMIC COLLISION CROSS SECTIONS.
Final rept. for 1 Dec 58-30 Nov 64,
by R. F. Stebbings. 27 Nov 64, 58p GA-5861
Contract Nonr278600, Proj. NR012 108
Unclassified report

Descriptors: (*Atomic structure, Measurement), (*Electrons, Excitation), (*Upper atmosphere, Gas ionization), Atoms, Hydrogen, Oxygen, Nitrogen, Photons, Ions, Scattering, Ionization potentials, Ionization, Polarization, Electron capture, Space environmental conditions.

The production of Lyman-alpha radiation in H(+) -H (1s) collisions has been investigated. The cross sections for 1s-2p excitation of the thermal-energy-target H atoms, and for electron capture into the 2p state of the projectiles, have been determined separately. These measurements are of particular significance in that they provide experimental information on a heavy-particle inelastic collision, involving only one electron, in which the states of all interacting particles are determined. Comparison with the results of calculation subjects the validity of the scattering approximations to direct scrutiny. It appears that the low energy behavior for both excitation and capture is adequately represented by theory as is the high-energy behavior for electron capture. The calculations appear to over-estimate the cross section for 1s-2p excitation by about a factor of 2 at the high energies. Electron impact ionization of molecular oxygen was investigated in the immediate vicinity of threshold using electron beams of high energy-resolution. The results suggest that a re-evaluation of the mechanism of the ionizing process may be necessary.

AD-609 171 Div. 25
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
STUDIES ON THE THEORY OF CRYSTAL GROWTH AND PHASE TRANSITIONS,
by B. Ya. Lyubov. Jul 64, 8p AmMetSoc-T-R-446
Contract AF19 628 3880
TT 65 60444
Unclassified report

Issledovaniya po Teorii Rosta Kristallov i Fazovym Perekhodam, trans. of Akademiya Nauk SSSR. Vestnik, 1962, v. 32, no. 1, p. 134-136.

Descriptors: (*Solid state physics, Crystallography), (*Crystal growth, Phase studies), Semiconductors, Kinetic theory, Liquids, Vapors, Crystallization, Metallic crystals, Surface tension, Symposia, USSR.

AD-609 177 Div. 25, 8, 20
OTS Prices: HC $4.00/MF $1.00

General Motors Research Labs., Warren, Mich.
INVESTIGATIONS ON THE DIRECT CONVERSION OF NUCLEAR FISSION ENERGY TO ELECTRICAL ENERGY IN A PLASMA DIODE.
Annual rept. no. 5, 1 Nov 63-31 Oct 64,
by C. B. Leffert, D. B. Rees, and F. E. Jamerson.
31 Oct 64, 119p
Contract Nonr310900
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy. See also AD-273 067, AD-425 231.

Descriptors: (*Energy conversion, Diodes), (*Energy, Nuclear reactions), (*Plasma medium, diodes), (*Diodes, Plasma medium), Nuclear energy, Electricity, Fission, Ions, Ionization, Helium group gases, Cesium, Argon, Neon, Zenon.

AD-609 178 Div. 25
OTS Prices: HC $3.00/MF $0.75

Digital Computer Lab., Univ. of Illinois, Urbana.
NOVEL ELECTRO-OPTICAL LIGHT MODULATORS.
Doctoral thesis,
by Gabor Kalman Ujhelyi. 26 Oct 64, 95p
ILU-DCL-170
Contract Nonr183415
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electron optics, Refraction), (*Light, Modulation), Electric fields, Light transmission, Refractive index, Deflection, Intensity, Distortion, Anisotropy, Nitrobenzenes, Kerr cells, Theory.

To the well developed family of Kerr-cell type devices two novel electro-optical devices are proposed: a direct intensity modulator and a light beam deflecting device. The theoretical background of the electro-optically induced birefringence is examined. Starting from the anisotropic material equations and Maxwell's differential equations, an analytical derivation of this birefringence is given. Furthermore it is shown how the electro-optical effect influences the material equations, hence its effect on the birefringence is derived. The experimentally determined electro-optic effect is tabulated for the most important materials. The new intensity modulator operates on the principle of electro-optically controlled partial reflections. A systematic and quantitative procedure is presented for the optimized design of a broadband intensity modulator. The modulating frequency of the device is fundamentally limited only by the dispersion of material parameters. The beam deflecting device uses the fact that a variation of the index of refraction n causes a light beam to change direction of propagation. The desired variation of n (hence the deflection of the beam) can be achieved by placing an electro-optical material in a suitable electric field distribution. The experimental results obtained with three divices support the theoretical predictions. Intensity modulation up to 50% and a deflection of .003 radian were observed in the laboratory using nitrobenzene as the electro-optic material.

AD-609 184 Div. 25
OTS Prices: HC $4.00/MF $1.00

Materials Research Lab., Pennsylvania State Univ., University Park.
THE EFFECT OF PRESSURES TO 10 KBARS ON THE OPTICAL ROTATORY POWER AND ROTATORY DISPERSION OF CRYSTALS.

Technical rept. no. 20,
by Mark Briner Myers. Dec 64, 145p
Contract Nonr65620

Unclassified report

Doctoral thesis.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Crystals, Optical properties), Single crystals, Pressure, Quartz, Sodium compounds, Chlorates, Amines, Sulfates, Rotation, Ketones, High-pressure research.

The optical rotatory power of crystals is dependent on both temperature and pressure. The principal contribution to the variation of optical rotatory power is due the volume change of the crystal. The change of rotatory power with pressure and temperature is due to the change of the absorption spectrum of the crystal. The principal contribution to the variation of optical rotatory power with pressure and temperature is attributed to a parameter which is present in the phenomenon of optical rotatory power but not present in the related phenomenon of ordinary refraction of light.

AD-609 185 Div. 25, 2
OTS Prices: HC $3.00/MF $0.75

Rome Air Development Center, Griffiss AFB, N. Y.
PARAMAGNETIC RESONANCE ABSORPTION SPECTRA OF DIVALENT MANGANESE AND TRIVALENT IRON IN CALCITE.
Final rept.,
by James G. Constantine. Jul 64, 89p
Proj. 8503, Task 850302
RADC TDR64 241

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Calcite, Paramagnetic resonance), (*Manganese, Absorption spectrum), (*Iron, Absorption spectrum), Single crystals, Crystal structure, Crystal lattices, Calcium compounds, Carbonates, Electromagnetic fields, Mathematical analysis, Impurities, X band.

The electron paramagnetic resonance absorption spectra of divalent manganese and trivalent iron in single crystals of natural calcite were observed at x-band frequencies. Careful relative intensity measurements of the doublet structure of these spectra, resulting from the difference in the crystal-line electric fields at the two calcium Ca(++) substitutional sites occupied by manganese Mn(++) and iron Fe(+++) ions, were made. These measurements showed that manganese does not preferentially occupy either of the two magnetically nonequivalent sites, while iron shows preferential occupation of one site. In both cases, samples of approximately the same ion concentration were used.

AD-609 186 Div. 25
OTS Prices: HC $4.00/MF $0.75

Minnesota Univ., Minneapolis.
ISOTOPIC ABUNDANCE STUDIES OF HOMONUCLEAR AND HETERONUCLEAR MOLECULAR IONS IN RARE-GAS PLASMAS.
Technical rept. no. 5,
by M. A. Mosharrafa and H. J. Oskam. Oct 64, 111p
Contract Nonr71037, Task 012 206

Unclassified report

Descriptors: (*Plasma medium, Helium group gases), (*Ions, Abundance), (*Helium group gases, Ions), Mass spectroscopy, Isotopes, Gases, Ionization, Molecular spectroscopy, Gas ionization, Argon, Krypton, Neon, Ion beams, Electrons.

This work is primarily concerned with the theoretical and experimental study of the molecular ion densities existing in plasmas produced in inert gases and their mixtures. The experimental investigations were accomplished through the use of a quadrupole mass-spectrometer, designed specifically for this type of application. Isotopic abundance measuring techniques were also used for correct identification purposes. One of the prime objectives of this investigation was, to shed some light on the contraversial question of the existence of rare-gas hybrid molecular ions in plasmas. All heteronuclear rare-gas molecular ions have been found to exist as products of the interaction of electron beams with rare-gas mixtures, although no measurements of their isotopic abundances were reported.

AD-609 214 Div. 25, 9
OTS Prices: HC $3.00/MF $0.75

AeroChem Research Labs., Inc., Princeton, N. J.
AN ANOMALOUS EFFECT OF MAGNETIC FIELD ON STAGNATION-POINT HEAT-TRANSFER IN A SUPERSONIC PLASMA.
Final Technical rept. for 1 Dec 62-30 Nov 63,
by S. A. Gordon. Feb 64, 58p AeroChem-TP-80
Contract AF33 657 10341, Proj. 7063, Tasks 706303, 01

Unclassified report

Descriptors: (*Plasma medium, Magnetic fields), (*Magnetic fields, Plasma medium), (*Heat transfer, Plasma medium), (*Supersonic flow, Plasma medium), Stagnation point, Fluid flow, Supersonic nozzles, Plasma jets, Argon, Continuum mechanics, Atmospheric entry.

An investigation of the effect of a dipole-like magnetic field on heat transfer to a forward stagnation point in a Mach 3 Argon plasma has led to a surprising result. Rather than indicating a change in heat transfer coefficient, the measurements point to a change in the flow field of such a nature that the effective recovery temperature of the gas at the stagnation point is reduced. This effect is much larger than that which present continuum theory predicts, is dependent on conditions upstream of the test section and is also a function of magnetic field direction. (Author)

AD-609 218 Div. 25, 2, 12
OTS Prices: HC $2.00/MF $0.50

Lightning and Transients Research Inst.,
Minneapolis, Minn.
NATURAL INTERFERENCE CONTROL TECHNIQUES. PART III. ELECTROMAGNETIC TRANSIENT PENETRATION OF AEROSPACE VEHICLE SYSTEMS,
by J. R. Stahmann. Oct 64, 39p L-T-424
Contract AF33 657 10904, Proj. 4357, Task 435706
ASD TDR63 370 P3

Unclassified report

Jointly sponsored by the Air Force Avionics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio and the Bureau of Naval Weapons, Navy Dept., Washington, D. C. See also AD-409 692.

Descriptors: (*Aerospace craft, Electromagnetic shielding), (*Atmospheric electricity, Lightning arresters), (*Plasma medium, Atmospheric

electricity), Electromagnetic waves, Plasma sheath, Plasma physics, Molecules, Transients, Lightning, Voltage, Rockets, Protective coverings, Fuel tanks, Metals, Rocket launchers, Electric cables.

The discussion is aimed primarily at a descriptive statement of the physical properties of molecular plasmas in the atmosphere, and their potentialities as hazards to aircraft. The ideas are deduced by consideration of a wide variety of manifestations of atmospheric electricity. All of these phenomena point conclusively to the widespread existence of atmospheric molecular plasmas. Practical metal skin enclosures such as aircraft, missiles and other aerospace vehicles and weapons systems usually have electrical discontinuities at joints, access doors, inspection panels, fuel caps, ports, covers and other points due to construction and operational requirements. The cables connected to rocket vehicles prior to launch also can cause voltages to be coupled inside the vehicle during a lightning stroke. These voltages may be reduced to the sheath iR drop with a well shielded system and techniques are also available to reduce sheath currents.

AD-609 229 Div. 25, 20
OTS Prices: HC $2.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
SPIN LATTICE RELAXATION BY LOCAL MODES: THEORETICAL CONSIDERATIONS.
Scientific rept. no. 4,
by D. W. Feldman, J. G. Castle, Jr., and J. Murphy.
10 Nov 64, 27p
Contract AF19 628 3838, Proj. 4608, Task 460801
AFCRL 64 923

Unclassified report

Descriptors: (*Nuclear spins, Relaxation time), (*Relaxation time, Nuclear spins), (*Crystal lattice defects, Nuclear spins), Temperature, Strain (Mechanics), Color centers, Field theory, Quantum mechanics, Hamiltonian, Theory, Electrons, Phonons, Spin, Hydrogen, Calcium compounds, Fluorides.

A theoretical discussion of the temperature dependence of spin-lattice relaxation is given in which the role of local modes at light-mass defects is emphasized. Diagrams, analogous to those used by R. P. Feynman in quantum electrodynamics, are used. (Author)

AD-609 234 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Army Missile Command Redstone Arsenal, Ala.
PRELIMINARY INVESTIGATION OF THERMAL CONDITIONS INSIDE LARGE LIQUID OXYGEN CONTAINER EXPOSED TO CLIMATIC HEATING,
by Carvel E. Mair. 24 Aug 56, 22p
AMC-RA TN G-024

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Oxygen, Phase studies), (*Heat transfer coefficients, Liquefied gases), (*Containers, Thermal conductivity), Heat transfer, Thermodynamics, Atmospheric temperature, Heating, Storage, Evaporation, Distribution.

A large uninsulated liquid oxygen container made of aluminum and only partially filled was exposed to climatic heating. Horizontal and vertical temperature profiles within the liquid were measured. Of the heat crossing the container wall the amount used for increasing the temperature of the liquid and the portion used for evaporating the liquid were determined. Heat transfer coefficients from wall to non boiling liquid oxygen were estimated. (Author)

AD-609 273 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Valley Forge Space Technology Center, Philadelphia, Pa.
INVESTIGATION OF MAGNETICALLY INDUCED IONIZATION.
Semi-annual technical summary rept. no. 4, 1 May-31 Oct 64,
by B. Zauderer. 31 Oct 64, 50p
Contract Nonr386700, Proj. 9800

Unclassified report

See also AD-600 531.

Descriptors: (*Magnetohydrodynamics, Electric power production), (*Gas ionization, Magnetic fields), (*Xenon, Gas ionization), Generators, Shock tubes, Hall effect, Plasma sheath, Electrodes, Electrical conductance.

Experiments were performed in the shock tube-MHD generator under the following conditions: The test gas was xenon with temperatures between 3600K and 9500K, electron densities between 10 to the 9th and 16th power electrons/cc, electrical conductivities between 0.01 mhos/m and 3000 mhos/m. The magnetic field strength was varied from 5000 to 30000 gauss. Six electrode geometries were used. The major results obtained were: Below electron densities of 10 to the 12th power electrons/cc, sheaths effects at the electrodes completely controlled the generator performance. Between 10 to the 12th and 14th power electrons/cc, the sheath resistance was greatly reduced if the applied Faraday field was greater than 1000 v/m. Above 10 to the 14th power electrons/cc, the electrode current mechanism was found to be the same as in the cold cathode arc and the sheath resistance was negligible. The measured Hall voltage was appreciably lower than the theoretical value. However, it was determined that the sheath effect was more detrimental to the achievement of magnetically induced ionization than the low Hall voltage.

AD-609 291 Div. 25
OTS Prices: HC $1.00/MF $0.50

Aerojet-General Corp., Downey, Calif.
ON THE PROBLEM OF FRACTURING SOLIDS INTO VERY SMALL FRAGMENTS USING EXPLOSIVE LOADING TECHNIQUES,
by J. R. Galli. 23 Aug 63, 17p
AGC-0395-04(09)SP
Contract DA18 108 405cm1829

Unclassified report

Descriptors: (*Solids, Fracture (Mechanics)), (*Loading (Mechanics), Fragmentation), Particles, Explosions, Statics, Dynamics, Stresses, Propagation, Sintering, Theory.

An analysis of the problem of breaking up solids into very small particles by means of explosive loading techniques is made. The important parameters which effect the strength and ductility of solids under 'static' (slow strain rate) loading conditions are discussed as well as the parameters and modes of fracture which are important under dynamic loading conditions. Some possible paths to direct future research are indicated. (Author)

AD-609 298 Div. 25
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.

SPIN RELAXATION OF ATOMIC HYDROGEN IN CaF2: EVIDENCE FOR LOCAL MODES.
Scientific rept. no. 3,
by D. W. Feldman and J. G. Castle, Jr. 15 Jul 64, 22p
Contract AF19 628 3838, Proj. 4608, Task 460801
AFCRL 64 645

Unclassified report

Descriptors: (*Nuclear spins, Relaxation time), (*Relaxation time, Nuclear spins), (*Hydrogen, Nuclear spins), Crystal lattice defects, Strain (Mechanics), Solid state physics, Temperature, Resonance, Spin, Hyperfine structure, Electrons, Excitation, Deuterium, Calcium compounds, Fluorides, Color centers, Nuclear magnetic moments.

The spin-lattice relaxation time, T sub 1, of atomic hydrogen in calcium fluoride has been measured at 3 k0e and at temperatures from 2.1K to 165K. The characteristic temperature are: theta = 474K and T sub H = 850 ± 60K. Similar measurements have been made on atomic deuterium centers. The relaxation data for deuterium centers can be accurately fitted by an expression in which there is an additional term due to cross relaxation. The characteristic temperatures of 850 and 640K are interpreted in terms of local modes which involve the motion of the interstitial hydrogen and deuterium atoms with respect to neighboring fluorines. The basis for this identification is discussed in terms of Feynman diagrams. (Author)

AD-609 300 Div. 25, 4
OTS Prices: HC $4.00/MF $1.00

Ohio State Univ. Research Foundation, Columbus.
THE INFRARED VIBRATION-ROTATION ABSORPTION BANDS OF METHYL CYANIDE AND METHYL FLUORIDE.
Scientific rept. 3,
by Frederick L. Yarger. Sep 64, 146p
Contract AF19 604 6150, Proj. 7670, Task 767002
AFCRL 64 933

Unclassified report

Descriptors: (*Fluorides, Absorption spectrum), (*Cyanides, Absorption spectrum), Nitriles, Infrared spectroscopy, Vibration, Rotation, Molecular properties, Band spectrum, Tables.

The study of the infrared absorption spectra of methyl cyanide vapor was undertaken primarily for determining the correct Coriolis coupling coefficient for the fundamental band. The study of some of the vibration-rotation fundamentals of the methyl fluoride molecule was undertaken primarily to investigate the effects of Coriolis resonance between the parallel band and the perpendicular band. Bands of both the isotopic species, CH3F and CD3F, were studied.

AD-609 310 Div. 25, 32
OTS Prices: HC $2.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
LUMINESCENCE OF COMPLEX MOLECULES, BIBLIOGRAPHY.
Rept. no. 3, Apr - Sep 63.
2 Sep 64, 41p
Task 4
ATD U 64 97

Unclassified report

Descriptors: (*Complex compounds, Luminescence), (*Bibliographies, Complex compounds), Organic compounds, Molecules, Polarization, USSR.

A bibliography of 169 references is given on luminescence of complex molecules.

AD-609 316 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

California Univ., Riverside.
THE ELECTRICAL PROPERTIES OF SEMIPERMEABLE MEMBRANES.
Annual summary rept. for 1 Jan-31 Dec 64,
by L. J. Bruner. 31 Dec 64, 37p
Contract Nonr444300, Task 314 102

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Membranes, Semipermeability), (*Electrical properties, Membranes), Kinetic theory, Laminar flow, Ions, Voltage, Potential theory, Quantum statistics, Numerical analysis, Nonlinear differential equations, Electrical conductance.

A kinetic analysis of membrane conductance under conditions of stationary flow is presented. The semipermeable membrane is idealized as a homogeneous laminar phase separating ionic solutions on either side. It is assumed, without consideration of the mechanisms involved, that some ion species permeate the membrane while others do not. The flux of a given species is taken to be linearly related to the gradient of its concentration and to the electric field. The resulting flow equations, when combined with Poisson's equation, permit the formulation of the conductance problem in terms of a set of non-linear differential equations. They describe the spatial variation of the electric displacement and contain the ion current densities as parameters. Their integration, subject to appropriate boundary conditions, fixes the values of these parameters and of the corresponding trans-membrane potential. The solution of the conductance problem cannot, however, be carried through in analytic form. The numerical analysis of a number of special cases will be presented in subsequent publications. (Author)

AD-609 336 Div. 25
OTS Prices: HC $1.00/MF $0.50

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
EVALUATION OF THE TENSILE STRESS RELAXATION TEST,
by J. H. Thacher. Sep 64, 12p ABL/Z-77

Unclassified report

Rept. prepared for presentation at the Annual Meeting of the Working Group on Mechanical Behavior (2nd), Hill AFB, Utah, 19-21 Nov 63.

Descriptors: (*Test methods, Tensile properties), (*Tensile properties, Test methods), Materials, Viscoelasticity, Mechanical properties, Relaxation time, Thermal stresses, Thermal conductivity, Stresses, Equations.

The tensile stress relaxation test is widely used to measure the mechanical properties of viscoelastic materials. For certain combinations of test conditions and materials the interpretation of data from this test will be influenced by sample inertia, test apparatus elasticity, and/or internal heat generation. Sample inertia causes longitudinal waves to be generated within the sample upon application of a prescribed end displacement. Wave propagation in viscoelastic materials is described as it relates to the tensile-stress-relaxation experiment. This

behavior is contrasted with quasi-static behavior. A nonrigid test apparatus modifies the measured relaxation time of the material. At high strain rates, the test-apparatus elasticity permits the existency of transmitted as well as reflected waves at the boundary between sample and test machine. The effect of internal heat generation consists of thermodynamic coupling and heat dissipation terms which alter the material response. Thermal stresses are produced and relaxation times are modified. The behavior of a thermorheologically simple material is discussed. Quantitative calculations are made for a two-parameter Maxwell material. Limitations of the theory are noted. (Author)

AD-609 344 Div. 25, 9
OTS Prices: HC $3.00/MF $0.75

Plasma Lab., Columbia Univ., New York.
NORMAL IONIZING SHOCK WAVES; THE EFFECTS OF EQUILIBRIUM, DISSOCIATION AND IONIZATION.
Rept. no. 14,
by Robert Taussig. Aug 64, 61p
Contract AF49 638 1254
NP 14546

Unclassified report

Descriptors: (*Shock waves, Magnetohydrodynamics), (*Magnetohydrodynamics, Shock waves), (*Gas ionization, Shock waves), Fluid mechanics, Gases, Kinetic theory, Dissociation, Ionization, Mathematical analysis.

Solutions for a model of a normal ionizing shock wave in an electromagnetic field are obtained. The model considers an ideal monatomic gas, and includes the equilibrium composition of the gas, the chemical energy of ionization and dissociation absorbed at the shock front. Solutions for this more complex, and more realistic, model are called solutions with chemistry, in contrast to the ideal gas solutions for the simple model analyzed before. The gas is composed of four chemical species, H sub 2 H, H(+), and e(-), assumed to be at chemical equilibrium upstream and downstream from the shock.

AD-609 345 Div. 25, 4, 20
OTS Prices: HC $3.00/MF $0.75

Plasma Lab., Columbia Univ., New York.
TRANSPORT PROPERTIES OF HYDROGEN.
Rept. no. 13,
by Dieter Brezing. Sep 64, 71p
Contract AF49 638 1254
NP 14534

Unclassified report

Supported jointly by National Aeronautics and Space Administration, Washington, D. C. and the European Space Research Organization through an International University Fellowship granted the author.

Descriptors: (*Hydrogen, Transport properties), (*Transport properties, Hydrogen), Charged particles, Gases, Quantum mechanics, Viscosity, Thermal conductivity, Electrical conductance, Thermoelectricity, Heat transfer, Atoms, Electrons, Differential cross sections, Integrals, Diffusion, Chemical equilibrium, Kinetic theory, Integral equations, Differential equations.

The transport properties of hydrogen are calculated for a pressure range from 10 to the minus 6th power (atm) to 100 (atm), and at temperatures up to 10 to the 6th power (K). The lower temperature limit is taken where the equilibrium gas mixture contains less than 1% molecular hydrogen. The Boltzmann formalism, which assumes binary collisions in the expressions for the transport properties of gas mixtures, is applied. Theoretical values, supported by experimental data whenever possible are used for the atom-atom, atom-ion, and atom-electron collision cross sections. For Coulomb force interactions between charged particles, the Debye length is used as cutoff distance. The collision integrals for all interactions are computed. Values of viscosity, thermal, and electrical transport coefficients, as well as the thermoelectric coefficients are calculated. (Author)

AD-609 357 Div. 25
OTS Prices: HC $3.00/MF $0.50

Institute for the Study of Metals, Univ. of Chicago, Ill.
CRYSTAL STRUCTURES OF THE SIMPLE METALS: ROLE OF CORRELATION AND EXCHANGE.
Technical rept.,
by M. H. Cohen. 26 Oct 64, 52p
Contract Nonr212122, Proj. NR017632

Unclassified report

Descriptors: (*Crystal structure, Mathematical models), (*Metals, Crystal structure), Electrons, Field theory, Matrix algebra, Zinc, Complex variables, Solid state physics, Integration, Corrections, Dielectric properties, Transformations (Mathematics), Atomic structure, Ionization potentials, Crystals.

Using a momentum-independent pseudopotential, we have derived an expression for the contribution of correlation and exchange to the structure-dependent part of the cohesive energy. Our only approximation consists of replacing the exact dielectric matrix by the Hartree dielectric matrix in the correlation-and-exchange term of Cohen's dielectric formulation for the ground state energy of a nonuniform, many-electron system. The nature of and the justification for this approximation are discussed. The correlation-and-exchange part of the structure-dependent energy is shown to be separable into two parts, one part arising from the random phase approximation to the Hartree dielectric matrix and the other part arising from the local field corrections. Each of these two terms constitutes a significant correction to the structure-dependent energy calculated in the Hartree approximation. The sum of the two terms very nearly cancels in some regions of wavenumber space, but the local field term dominates in the most important region. An explicit illustration of the determination of the crystal structure with correlation and exchange included is given with a momentum-independent pseudopotential appropriate to Zn. (Author)

AD-609 386 Div. 25
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
TRANSVERSE PINCH OSCILLATIONS,
by Burton D. Fried. 24 Mar 60, 11p
STL/TN-60-0000-09059
Contract AF04 647 309
NP 8590, PB 146 873

Unclassified report

Descriptors: (*Magnetic pinch, Oscillation), Magnetic fields, Plasma physics, Plasma medium, Magnetohydrodynamics, Mathematical models.

It is shown that the oscillations or 'bouncing' of a transverse pinch are predicted by a simple model in which no trapped magnetic field is assumed.

AD-609 388 Div. 25
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.

ELEMENTARY DYNAMICS OF THE NON-ADIABATIC TRANSVERSE PINCH,
by Burton D. Fried. 7 Jan 59, 25p
STL/TR-59-0000-00561
Contract AF04 647 309

Unclassified report

Descriptors: (*Magnetic pinch, Dynamics), Magnetic fields, Plasma physics, Particles, Coils, Circuits.

A transverse pinch is one in which the current flows in planes perpendicular to the symmetry axis, producing a magnetic field parallel to that axis. (In the more common longitudinal pinch the current flow is parallel to the symmetry axis and the resulting magnetic field lies entirely in the plane normal to the axis.) If the pinching velocity is small compared to the initial thermal velocities in the plasma, the pinch may be described as adiabatic, the heating being governed by the amount of compression. In the opposite limit, where the thermal velocities are negligible compared to the velocity of the pinch, the heating is of a shock or non-adiabatic character and depends much more sensitively on the speed of the pinch than on the amount of compression.

AD-609 408 Div. 25
OTS Prices: HC $1.00/MF $0.50

Honeywell Research Center, Hopkins, Minn.
DISLOCATIONS IN COUPLE STRESS ELASTICITY.
Technical rept. no. 27,
by H. Cohen. Nov 64, 25p HR-64-290
Contract Nonr407600, Proj. NR032 451

Unclassified report

Descriptors: (*Stresses, Elasticity), (*Elasticity, Stresses), Mechanics, Linear systems, Deformation, Cylindrical bodies, Mathematical analysis.

The equations of linear couple stress elasticity are used to find stress distributions due to the simple edge and screw dislocations in a hollow circular cylinder. The stress fields resulting from the edge dislocation are found to deviate considerably from their classical values as the radius of the dislocation core approaches the characteristic length of the couple stress media. Furthermore, couples exist on the ends of the cylinder in order to maintain a state of plane deformation. For a screw dislocation along the axis of a circular cylinder the resulting twist is found to decrease from its classical value as the radius of the cylinder approaches the characteristic length of the media. (Author)

AD-609 417 Div. 25, 9
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
DIRECT ENERGY CONVERSION SYSTEMS. SUPPLEMENT 2. TRANSPORT PROPERTIES OF PARTIALLY IONIZED MONATOMIC GASES.
Quarterly technical summary rept. no. 4, suppl. 2,
1 Jun - 31 Aug 64,
by R. Stephen deVoto. 30 Sep 64, 66p
Contract AF49 638 1123, ARPA Order 246
NP 14536

Unclassified report

See also AD-609 415, AD-609 416.

Descriptors: (*Energy conversion, Scientific research), (*Transport properties, Plasma medium), (*Plasma medium, Transport properties), (*Gases transport properties), Thermal conductivity, Thermal diffusion, Viscosity, Electrical properties, Mathematical analysis, Special functions (Mathematical), Quantum mechanics, Statistical functions, Determinants, Integrals, Series, Matrix algebra.

This report is concerned with special problems which arise in connection with calculations of the transport properties of partially ionized monatomic gases. The most serious problem concerns the lack of agreement of the usual thermal conductivity expression in the limit of full-ionization with other results derived explicitly for this case. It is shown that satisfactory agreement can be obtained in this limit if one uses the third rather than the second approximation in the Chapman-Enskog theory. Expressions for the fourth and lower approximations to the thermal conductivity, the thermal diffusion coefficient, and the ordinary diffusion coefficient of multicomponent gases are derived. The viscosity of this mixture is considered to the second approximation. It is shown that the thermal diffusion plays a very important role in an ionized gas. Neglect of this effect can cause the thermal conductivity to be seriously overestimated. An expression is presented which approximates the effect of the thermal diffusion on the thermal conductivity. The charged particle cross-section is considered with the screened Coulomb potential.

AD-609 418 Div. 25
OTS Prices: HC $3.00/MF $0.75

Johns Hopkins Univ., Baltimore, Md.
THE SPECTRUM OF DOUBLY IONIZED PRASEODYMIUM.
Spectroscopic rept. no. 22,
by J. Sugar. Dec 61, 64p
Contract AF49 638 535
AFOSR 4543

Unclassified report

Descriptors: (*Praseodymium, Spectra (Visible and Ultraviolet), Spectra (Infrared), Atomic energy levels, Electron transitions, Ions, Hyperfine structure, Ionization, Ionization potentials, Excitation, Quantum statistics, Electrons, Line spectrum.

The spectrum of Pr(2+) (PrIII) produced by a low-energy spark discharge in helium was observed from 2025 A to 10716 A. The resulting line-list contains about 4,000 entries, some 1600 of which have been classified in an energy level scheme consisting of 118 odd and 130 even levels. Almost all the expected levels of the 4f3, 4f(2)5d, 4f(2)6p configurations have been located, as well as some levels of the 4f5d2 and 4f(2)6d groups. The ground state of the ion was found to be the 4I9/2 level of the 4f3 configuration. The structure of the 4f(2)6s and 4f(2)6p groups indicate well developed J1j-coupling, while the remaining configurations were interpreted in terms of LS-coupling. An ionization potential of 23.2 volts was obtained from levels of the two member 4f2nd series. (Author)

AD-609 419 Div. 25, 17
OTS Prices: HC $4.00/MF $0.75

Johns Hopkins Univ., Baltimore, Md.
THE SPECTRA OF DOUBLY AND TRIPLY IONIZED YTTERBIUM.
Spectroscopic rept. no. 21,
by Barry W. Bryant. Sep 61, 101p
Contract AF49 638 535
AFOSR 4544

Unclassified report

Descriptors: (*Ytterbium, Spectra (Visible and Ultraviolet), Spectra (Infrared), Atomic energy levels, Line spectrum, Electron transitions, Quantum statistics, Ionization, Excitation, Ions, Hyperfine structure, Electrons.

The emission spectrum of ytterbium was photographed

under varied conditions from 600 A to 11,000 A in order to obtain a complete description of the spectra of the doubly and triply ionized species. The main transition arrays of these species were identified, and where feasible, the analysis carried through. All 41 energy levels, 28 odd and 13 even, belonging to the 4f14, 4f(13)5d, 4f(13)6s, 4f(13)6p and 4f(13)7s configurations of YbIII were experimentally determined along with the appropriate quantum numbers. Eleven of 20 possible 4f(13)6d levels and their quantum numbers were also determined. One hundred ninety three lines were classified in the YbIII energy level scheme with an average deviation of ±0. 05/cm. All the YbIII levels are supported by intermediate coupling calculations. The two 4f(13) levels of YbIV were determined in addition to 20 of a possible 107 4f(12)5d levels, of which a few are expected to be fortuitous. (Author)

AD-609 434 Div. 25
OTS Prices: HC $2.00/MF $0.50

Norwegian Defense Research Establishment, Oslo.
RESEARCH ON THE THEORY AND DESIGN OF ACTIVE NETWORKS.
Annual summary rept. no. 3, 1 Jul 63-30 Jun 64,
by Kjell Blotekjaer and Tor Schaug-Pettersen.
23 Jul 64, 36p NDRE-E-36
Contract AF61 052 484
AFCRL 64 823

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Solid state physics, Acoustics), (*Microwaves, Ultrasonic radiation), (*Acoustics, Piezoelectric crystals), (*Ultrasonic radiation, Piezoelectric crystals), Networks, Cadmium compounds, Sulfides, Harmonic analysis, Noise, Propagation, Semiconductors, Electromagnetic waves, Amplifiers, Transducers, Electrons, Phonons, Traveling-wave tubes, Oscillation.

The report is concerned with studies in microwave ultrasonics and acoustic wave propagation in piezoelectric semiconductors. Saturation due to acoustic oscillations in cadmium sulphide have been observed experimentally, and the drift mobility of electrons in the sample has been determined to 210 square cm/Vs at room temperature. A nonlinear coupling between acoustic waves and electromagnetic waves in piezoelectric materials is described, and an experiment for parametric excitation of subharmonics is outlined. The thermal noise due to free carriers in electroacoustic amplifiers is calculated. The equivalent noise temperature can be made considerably lower than the temperature of the amplifying crystal. A novel design of an efficient piezoelectric transducer for hypersonic waves is described. The coupler comprises a number of piezoelectric discs in a specific arrangement located in the gap of a reentrant microwave cavity. (Author)

AD-609 435 Div. 25
OTS Prices: HC $3.00/MF $0.75

Norwegian Defense Research Establishment, Oslo.
ACOUSTIC RESONANCE IN PIEZOELECTRIC CRYSTALS.
Scientific rept. no. 9,
by O. H. Longva. 17 Mar 64, 54p NDRE-E-30
Contract AF61 052 484
AFCRL 64 945

Unclassified report

Descriptors: (*Solid state physics, Acoustics), (*Acoustics, Piezoelectric crystals), (*Piezoelectric crystals, Resonance), (*Resonance, Piezoelectric crystals), Semiconductors, Cadmium compounds, Sulfides, Zinc compounds, Oxides, Propagation, Damping, Electrons, Electrical impedance, Mathematical models.

A propagating acoustic wave in a piezoelectric semiconductor suffers a damping engendered by interaction with conduction electrons. The mechanism of this damping is studied, with particular regard to its effect on acoustic resonance and thus on electric impedance. Explicit relations for electric impedance near acoustic resonance are given. Specific numerical examples for electrical impedance near longitudinal mode acoustic resonance are given for cadmium sulphide and zinc oxide. (Author)

26. Production and Management

AD-608 945 Div. 26
OTS Prices: HC $6.00/MF $1.25

Westinghouse Electric Corp., Blairsville, Pa.
HIGH ENERGY RATE EXTRUSION.
Final rept. for 23 Sep 60-31 Jan 64,
by J. M. Rippel. Sep 64, 202p
Contract AF33 600 41948, Proj. 7 882
ML TDR64 312
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Material forming, Structural parts), (*Extrusion, Alloys), Velocity, Titanium alloys, Stainless steel, Steel, Refractory metal alloys, Dies, Refractory coatings, Lubricants, Zirconium compounds, Oxides, Graphite, Wear resistance, Molybdenum alloys, Niobium alloys, Surface properties.

Thin structural shapes can now be produced by high velocity extrusion equipment. Tooling, dies, die coatings, lubricants and general processing parameters have been developed to produce titanium alloy, stainless steel, low alloy steel and refractory metal alloy shapes. Extruded Tee sections, 2 inches by 1 inch by .050 inches thick, have been made in lengths of 10 feet from titanium-6Al-4V, AISI 4340 and 304 stainless steel. These extrusions have uniform surfaces (100 rms or better) and good dimensional tolerances (±.005 inch). The refractory metal alloys of molybdenum and columbium were made in shorter lengths and generally did not have as good a surface finish or tolerance. Dies coated with .010 inches of zirconia and lubricated with graphite proved much superior to conventional tool steel dies resisting wear at extrusion temperatures up to 3200F. The die entry angle of 90 degrees was important in reducing the initial peak stresses to a controllable level and tooling failures were reduced by using high strength (Rc 55-60) steels which withstood pressures of 300,000 psi. The tendency for inertial separation (the phenomenon wherein the extrusion pulls itself apart because of the high inertial forces present) can be lessened and eliminated in many cases by the selection of low reduction ratios (15:1 or below) and low impact speeds. (Author)

AD-609 022 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Martin Marietta Corp., Denver, Colo.
EVALUATION OF 2014-6061 ALUMINUM ALLOY WELDMENTS, HEAT TREATED AND AGED AFTER WELDING,
by R. Agricola. Jan 58, 17p WDD-M-MI-58-4
Contract AF04 645 56
Unclassified report

Descriptors: (*Aluminum alloys, Welds), (*Welds, Aluminum alloys), Heat treatment, Aging (Materials), Welding, Tensile properties, Sheets, Thickness, Tests.

Based on test results, the following conclusions were reached: For a 99-percent confidence level, the following are the expected design parameters when stops, starts, tacks ground out, and tacks welded over are included: 40,000 psi -- 0.05-in. material; 36,400 psi -- 0.125-in. material; 36,400 psi -- 0.25-in. material; Tensile elongations of 7.5 percent are typical for 0.05- and 0.125-in. material; however, the minimum elongations are 8.5 percent for 0.25-in. material; The recommended heat treatment for the bimetal junction is solution heat treatment at 950 = 10 deg F with a water quench, followed by an aging treatment at 350 = 10 deg F for eight hours, and subsequent cooling in air. The soaking times required for various sheet thicknesses are: < 0.032 in., 20 minutes; > 0.032-in. but < 0.10 in., 45 minutes; and > 0.10 in., 60 minutes. (Author)

AD-609 042 Div. 26, 30
OTS Prices: HC $3.00/MF $0.75

SKF Industries, Inc., Philadelphia, Pa.
A BASIC STUDY OF THE SLIDING CONTACTS IN ROLLING BEARINGS.
Progress rept. no. 2, 17 Jul-16 Oct 64,
by C. J. Belsky, K. Tataiah, J. Kamenshine, and S. C. Chou. 16 Oct 64, 63p AL64L087
Contract NOw64 0428C, Projs. 18 7, 19 1
Unclassified report

Descriptors: (*Roller bearings, Friction), (*Friction, Roller bearings), Motion, Test equipment, Loading (Mechanics), Surface properties, Deformation, Measurement, Experimental data, Test methods.

The study of skew and axial motion of the rollers in a rotating cylindrical roller bearing was continued. Signals from the distance gage, used in the measurement of roller skew and axial position of rollers, were tape recorded for four different operating conditions of an NU324 cylindrical roller bearing. The taped signals were recorded on an oscillograph, and skew angles and axial roller positions were computed for the four test conditions. The existing SKF two-ball machine was redesigned to study the initiation of smearing. The tester was also equipped with conductivity instrumentation for monitoring contact occurrences between the two balls under various test conditions. Design of a second two-ball tester to be used for wear tests in the Radio-tracer facility of the SKF Industries Research Laboratory is under way.

AD-609 072 Div. 26, 14, 17
OTS Prices: HC $3.00/MF $0.75

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Progress rept. no. 11, 22 Mar-22 Jun 64,
by E. F. Brady, A. Schwartz, J. McCool, R. Valori, and W. Schmidt. 22 Jun 64, 71p AL64T057
Contract NOw61 0716C, Proj. 18 3 to 6
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-602 643.

Descriptors: (*Roller bearings, Lubrication), (*Ball bearings, Lubrication), (*Lubrication, Roller bearings), Wear resistance, Tracer studies, Friction, Electrical conductance, Lubricants, Velocity, Steel, Autoradiography, Films, Life expectancy, Test methods, Ethers, Polymers, Phenols, Particle size, Mineral oils, Surface properties.

Radiotracer wear tests were performed on the rolling ball test configuration using techniques developed previously. The progressive wear rate as a function of speed was determined for a polyphenyl ether lubricant. A single wear test point was obtained for the base stock of the Mil-L-23699 lubricant previously tested. The development of high resolution autoradiography techniques for the measurement of wear particle size distribution was completed. A color tinting process was developed to allow easier interpretation of the autoradiograms. Autoradiographic techniques were applied to investigate metallic transfer between rolling metal surfaces, in

experiments performed on the rolling four-ball tester using a radioactive spindle ball and inactive orbiting balls. Conductivity tests were conducted in the rolling 4-ball machine using the base stock of a lubricant conforming to Mil-L-23699 and a highly refined mineral oil (Primol 355) with a spindle load of 182 lbs. (Author)

AD-609 086 Div. 26, 9
OTS Prices: HC $1.00/MF $0.50

Laboratories for Research and Development,
Franklin Inst., Philadelphia, Pa.
AN ANALYSIS OF THE TRAILING-EDGE EFFECT IN SLIDER AND PARTIAL ARC GAS-LUBRICATED BEARINGS.
Interim rept.,
by H. G. Elrod, Jr., and J. T. McCabe. Dec 64, 18p
I-A2049-22
Contract Nonr234200, Proj. NR062 316
Unclassified report

Partly supported by the Atomic Energy Commission and the National Aeronautics and Space Administration.

Descriptors: (*Journal bearing, Gas bearings), (*Gas bearings, Lubrication), Boundary layer, Fluid flow, Differential equations, Boundary value problems, Mathematical analysis, Pressure, Distribution.

The purpose of this report is to present an analysis for the high-speed pressure distribution within partial-arc and slider gas bearings. Such an analysis is desirable because of the difficulty in obtaining accurate computer solutions for this regime of operation with the use of customary finite-difference nets, and because of the understanding it provides concerning a basic phenomenon.

AD-609 115 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
INTERFACE FRICTION IN HOT METAL DEFORMATION.
Bimonthly progress rept. no. 2, 24 Jul-23 Sep 64.
22 Oct 64, 8p IITRI-B6027-2
Contract NOw64 0458f
Unclassified report

See also AD-604 437.

Descriptors: (*Metals, Surface properties), (*Hot working, Metals), (*Friction, Hot working), Aluminum alloys, Steel, Tool steel, Stainless steel, Deformation, Compressive properties, Dies, Lubrication, Chromium alloys, Austenite, Martensite.

An investigation of frictional phenomena encountered at the interface of tool and workpiece during the hot deformation processing of metals.

AD-609 145 Div. 26, 14
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson AFB, Ohio.
LUBRICATING AND PACKING SYSTEMS,
by I. V. Mazyrin. 23 Nov 64, 50p
FTD TT64 343; TT 65 60440
Unclassified report

Unedited rough draft trans. of mono. Spravochnik Mashinostroitelya v Shesti Tomakh, n.p., 1963, v. 4, pt. 2, chap. 20, p. 745-788.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Lubrication, Engineering), (*Seals (Stoppers), Lubrication), Bearings, Ball bearings, Journal bearings, Roller bearings, Lubricant pumps, Cleaning, USSR, Design.

General considerations in machine lubrication systems design and engineering are discussed and analyzed. Methods of lubrication are distinguished as to period of action into intermittent and continuous types; as to method of application, into individual and central types under pressure or without pressure; as to form of operation, into either flowing, circulating or mixed systems.

AD-609 190 Div. 26, 9
OTS Prices: HC $3.00/MF $0.75

Mechanical Technology, Inc., Latham, N. Y.
THE INFINITELY LONG PARTIAL ARC SELF-ACTING GAS BEARING, A METHOD OF SOLUTION FOR THE FULL RANGE OF THE COMPRESSIBILITY NUMBER.
Technical rept.,
by C. H. T. Pan, R. J. Wernick, H. Cheng, and L. Ting.
30 Nov 64, 55p MTI-64TR50, MTI-24(1-63)
Contract Nonr373000, Proj. NR061 131(17)
Unclassified report

Descriptors: (*Journal bearings, Gas bearings), (*Gas bearings, Compressive properties), Stability, Theory, Fluid flow, Mathematical analysis, Mathematical models Perturbation theory, Boundary layer, Boundary value problems, Integral equations, Differential equations, Tables, Computer logic, Loading (Mechanics).

In the case of the partial-arc, self-acting gas bearing, boundary layer effects (i.e., extremely rapid changes within a small region, generally at the boundary) can be shown to occur in the pressure at high values of the compressibility number. The method of solution whatever one is used, must take this type of phenomenon into account. For example, a finite difference solution might use a finer mesh in the boundary layer region. This report describes the modifications which must be made to Galerkin's method in treating the static solution of an infinitely long partial-arc, self-acting gas bearing. Similar modifications must also be employed for the analysis of finite length bearings as well as for the computation of the film pressure at dynamic conditions for the whole range of squeeze numbers. Thus the present work is merely the prelude to an ultimate analytical tool, which can be used practically for the generation of static and dynamic performance data of partial-arc, gas-lubricated, self-acting, bearing pads.

AD-609 340 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
PRESENT AND FUTURE PRODUCTION CAPABILITIES OF THE TITANIUM INDUSTRY FOR LARGE PLATE AND SHAPES.
Technical note, rev. ed.,
by R. A. Wood and T. G. Byrer. 10 Sep 64, 7p
Unclassified report

Descriptors: (*Titanium, Material forming), (*Material forming, Titanium), Metal plates, Structural parts, Production, Metallurgy, Rolling (Metallurgy), Titanium alloys, Rolling mills, Extrusion, Presses (Machinery).

A survey of the titanium producers concerning the present, the 1970, and the 1980 capabilities for making large titanium plate and shapes was conducted. This survey revealed that fairly large plates and shapes are presently available, that larger plates and shapes

are technically feasible, but that a relatively small demand for such products has prevented a rapid expansion of this special metal industry to proceed to the larger products. A guaranteed market must be available as the incentive for the industry to move in this direction. The technical problems associated with increased ingot size, increased yield from ingot to product, and increased product size, are not expected to cause insurmountable difficulties. New equipment would have to be obtained in some cases (e.g., melt furnaces, etc.). However, the present steel fabrication equipment appears to be adequate for the manufacture of the larger titanium products desired in the future. (Author)

AD-609 349 Div. 26, 1
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
A SURVEY OF THE COMPARATIVE COSTS OF FABRICATING AIRFRAME FROM ALUMINUM AND FROM TITANIUM.
Technical note.
15 Apr 64, 20p

Unclassified report

Descriptors: (*Titanium alloys, Airframes), (*Airframes, Costs), (*Aluminum alloys, Airframes), Material forming, Sheets, Machining, Welding, Chemical milling, Forging, Heat treatment, Supersonic planes, Transport planes.

By process, the cost ratios for fabricating titanium and aluminum are about as follows: Sheet Forming 1.5-2 to 1, Machining 1.5-2 to 1, Welding .8-2 to 1, Chemical Milling 3-4 to 1, Assembling 1.1 to 1, Forging 1.5-2.3 to 1, Heat Treating 1.5-5 to 1. The current cost estimates made by the experienced titanium fabricators represent realistic minimum cost ratios for the next 2 or 3 years. They are ratios which the less experienced fabricators should be able to approach in actual production. The experienced fabricators could probably not improve on them greatly in the next year or two. The above cost ratios apply only to specific fabrication operations (such as forming, machining, welding, etc.). These operations account for only a fraction of the total cost of manufacturing an aircraft. Most of the manufacturing costs not covered by these operations would be largely unaffected by the choice of airframe material.

AD-609 350 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
THE STRESS RELIEF OF TITANIUM WELDS FOR LOW-TEMPERATURE APPLICATIONS.
Technical note,
by R. M. Evans. 26 May 64, 5p

Unclassified report

Descriptors: (*Welds, Heat treatment), (*Titanium alloys, Welds), (*Titanium, Welds), Stresses, Temperature, Low-temperature research, Tensile properties, Elasticity, Fracture (Mechanics), Welding, Aluminum alloys, Tin alloys, Vanadium alloys.

Stress-relaxation annealing times and temperatures for different alloys are presented. The actual temperature and time should be determined for each heat of base metal, base-metal filler-metal combination, base-metal condition, and weld structure because they can vary with any or all of these variables.

AD-609 354 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
STATUS OF TITANIUM CASTINGS.
Technical note,
by J. G. Kura. 7 Oct 64, 3p

Unclassified report

Descriptors: (*Castings, Titanium), (*Titanium, Castings), (*Titanium alloys, Castings), Aluminum alloys, Tin alloys, Vanadium alloys, Casting, Hardness, Tensile properties, Molding.

The state of the art has not yet developed to the point where precision castings of titanium are being produced comparable with conventional metals cast in investment molds. Molten titanium is too reactive to be cast in conventional investment molds. However, the capability does exist for the production of castings of high quality, and Impel castings could be considered as being precision castings.

27. Propulsion Systems

AD-609 033 Div. 27, 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
VIBRATIONAL CHARACTERISTICS OF SOLID-PROPELLANT ROCKET ENGINES.
Semiannual rept. for 1 Jan-30 Jun 59,
by W. G. Gottenberg. 30 Jun 59, 18p
STL/TR-59-0000-00716
Contract AF04 647 309

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rocket motors (Solid propellant), Vibration), (*Propellant grains, Vibration), Dynamics, Cylindrical bodies, Viscoelasticity, Automatic pilots, Staging, Bonding, Structures, Simulation, Guided missiles.

An experimental program is described in which the bending and longitudinal dynamics of structures simulating solid-propellant rocket motors are being studied. The structure is considered to be a cylindrical grain of solid propellant to which is bonded a thin steel case. Vibrations of the empty steel cylinder suspended in a free-free condition are studied first. Secondly, a similar steel cylinder loaded with an inert propellant grain will be studied to determine the effect of the propellant on the vibrations of the case. Additional experiments to determine the viscoelastic properties of the propellant required for an analysis of the structure are discussed. (Author)

AD-609 055 Div. 27, 14
OTS Prices: HC $1.00/MF $0.50

Atlantic Research Corp., Alexandria, Va.
BEHAVIOR OF NOZZLE MATERIALS UNDER EXTREME ROCKET MOTOR ENVIRONMENTS.
Quarterly progress rept. no. 2, Aug-Oct 64,
by J. D. Batchelor, J. B. Murphy, and E. L. Olcott.
Nov 64, 14p
Contract NOw64 0393c

Unclassified report

See also AD-605 423.

Descriptors: (*Rocket motor nozzles, Materials), (*Graphite, Rocket motor nozzles), Test methods, Plasma medium, Laboratory furnaces, Environmental tests, Pipes, High-temperature research, Chemical reactions, Carbon dioxide, Hydrogen, Nitrogen, Water, Erosion, Carbides, Refractory materials.

During the second quarterly period of the program, further work was carried out on two experimental techniques using the plasma torch heat source. The test technique which exposes the bore of a tubular specimen to a high heat flux and a high velocity of selected gas mixtures was instrumented and operating conditions were studied. The technique was improved as a means of studying chemical reactions. Additional tubular specimens of refractory carbides are in preparation by Carborundum. The plasma torch impingement test method was used to obtain data for Graphitite GX specimens comparable to data published previously for other graphites. (Author)

AD-609 058 Div. 27, 1
OTS Prices: HC $6.00/MF $1.25

General Electric Co., Cincinnati, Ohio.
LIFT/CRUISE FAN EXHAUST SYSTEM RESEARCH PROGRAM.
Rept. for 6 Jun 63-3 Apr 64,
by W. A. Fasching and John Kutney. Sep 64, 220p
Contract DA44 177AMC74T,Task 1D121301A14228
TRECOM TR64 49

Unclassified report

Descriptors: (*Exhaust nozzles, Model tests), (*Jet engine nacelles, Turbofan engines), Conical nozzles, Plug nozzles, Wind tunnels, Thrust, Drag, Friction, Performance (Engineering), Velocity, Aerodynamic characteristics, Experimental data, Aerodynamic configurations, Pressure, Differential equations.

Results of static and wind tunnel cold-flow scale-model tests of convergent-conical nozzles and convergent-plug nozzles with a fore body and various afterbodies, simulating lift/cruise fan nacelle installations, are reported. Thrust-, drag-, and discharge-coefficients as well as model surface pressure distributions are presented for the representative lift/cruise fan nozzle pressure ratio range of 1.2 to 2.4 and flight Mach numbers of .0, .4, .6, .8, and .9. The test results are analyzed and compared to other test data and analytical calculations. (Author)

AD-609 137 Div. 27
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
JET NOZZLE,
by Yu. M. Dolzhanskii. 19 Nov 64, 4p
FTD TT64 1230; TT 65 60432

Unclassified report

Unedited rough draft trans. of Russian patent 154743, appl. 784120/24-6, 23 Jun 62.

Descriptors: (*Patents, Rocket motor nozzles), (*Rocket motor nozzles, Design), Jets, USSR, Screw threads.

A jet nozzle is described which contains a unit of threaded articulation with the body of the rocket engine, which is distinguished by the fact that for the purpose of assuring the possibility of using a nozzle of material with little shear effect the unit of the threaded articulation is designed in the form of a sleeve nut provided on the inner side with projections which on being assembled go through corresponding slots on the covering collar of the nozzle and being supported against the surface of intermediate sustaining half wheels in tightening up the nozzle. (Author)

AD-609 158 Div. 27
OTS Prices: HC $3.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AIR-BREATHING JET ENGINES,
by G. Yu. Mazing. 3 Dec 64, 77p
FTD MT64 225; TT 65 60458

Unclassified report

Edited machine trans. of mono. Vozdushno-Reaktivnye Dvigateli, Moscow, 1961, p. 1-72.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ramjet engines, Compressors), (*Ramjet inlets, Ramjet engines), USSR, Engine air systems components, Jet engine inlets, Rocket research, Rocket propulsion, Pulsejet engines.

Contents:
Introduction
Air-breathing jet engines without compressor
Air-breathing jet engines with compressor
Application of the air-breathing jet engine in rocket technology
A brief historical survey of air-breathing jet engines and prospects of their development
Literature.

AD-609 240 Div. 27, 9, 25
OTS Prices: HC $2.00/MF $0.50

Virginia Univ., Charlottesville.
BIBLIOGRAPHY OF SQUID PUBLICATIONS, OCTOBER 1963-SEPTEMBER 1964.
Technical rept.
Nov 64, 42p UVA-6-R
Contract Nonr362300, Proj. NR098 038
Unclassified report

Rept. on Proj. SQUID.

Descriptors: (*Bibliographies, Jet engines), (*Jet propulsion, Bibliographies), Gases, Transport properties, Structural properties, Fluid flow, Reaction kinetics, Combustion, Instrumentation, Materials.

The following list of Project SQUID publications represents a continuation of Project SQUID Technical Report UVA-3-R, October 1963 (AD-421 903). (Author)

AD-609 290 Div. 27
OTS Prices: HC $3.00/MF $0.75

Aerojet-General Corp., Sacramento, Calif.
DEVELOPMENT, DESIGN, FABRICATION, AND DEMONSTRATION OF PACKAGEABLE HIGH-EXPANSION-RATIO NOZZLES FOR SOLID PROPELLANT ROCKET MOTORS.
Quarterly rept. no. 2, 1 Sep-30 Nov 64,
by R. E. Morris. Dec 64, AGC-0874-82-2Q
Contract AF04 611 9896 Unclassified report

Descriptors: (*Rocket motors nozzles, Design), (*Rocket motors (Solid propellant), Rocket motors nozzles), Elastomers, Niobium, Manufacturing methods, Tests, Experimental data, Flexible structures.

The purpose of this program is the development, design, fabrication, and demonstration of packageable, high-expansion-ratio nozzles for solid propellant rocket motors. The program is to be accomplished by conducting (1) a design and analysis program adapting liquid technology to solid propellant motors; (2) a subscale test program to verify the selected designs; and (3) a demonstration test program that will utilize the test experience of the subscale program and demonstrate the feasibility of elastomeric and metallic packageable exit cones for solid motors. During this report period the subscale test program was successfully completed. On the demonstration program the progress was as follows: the design was completed on the metallic and elastomeric exit cones; the first four motors have been cast, the second motor has a bond separation and will require refurbishing; the igniters have been completed; and the nozzles are partially fabricated. (Author)

28. Psychology and Human Engineering

AD-608 935 Div. 28
OTS Prices: HC $4.00/MF $1.00

Washington Univ., Seattle.
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART IV, THE RELIABILITY OF MEASURES,
by Paul Horst. Dec 64, 130p
Contract Nonr47733; Grant PHS MH00743 08
Unclassified report

See also AD-608 424.

Descriptors: (*Psychology, Measurement), (*Psychometrics, Reliability), Test construction (Psychology), Statistical analysis, Correlation techniques, Equations, Sampling, Mathematical prediction, Performance (Human), Projective techniques, Behavior, Memory.

It has been recognized for some years that psychological measurement or psychometrics is concerned primarily with the entity mode of a two mode data matrix, while psychological scaling has been concerned with the attribute mode. Obviously, the two are inextricably interrelated, as the more sophisticated developments in factor analysis have made abundantly explicit. In spite of this interdependence an opaque, or at best a translucent, curtain continues to hang between psychometric and scaling activities. It is hoped that this series of reports may be followed by full scale programs to integrate the two fields of investigation, and that recent major developments in multimode factor analysis may lead to further integration of psychometric and scaling theory with learning theory and developmental psychology. Obviously, these latter involve the occasion mode of a three mode data matrix. This report is concerned with the reliability and validity of measurement.

AD-608 967 Div. 28
OTS Prices: HC $1.00/MF $0.50

Research Center for Group Dynamics, Univ. of Michigan, Ann Arbor.
STRUCTURAL BALANCE, RECIPROCITY, AND POSITIVITY AS SOURCES OF COGNITIVE BIAS.
Technical rept. no. 29,
by Robert B. Zajonc and Eugene Burnstein.
15 Oct 64, 22p
Contract Nonr122434, Proj. NR170 309
Unclassified report

Descriptors: (*Group dynamics, Psychometrics), (*Psychometrics, Group dynamics), Social psychology, Attitudes, Learning, Perception (Psychology), Personality, Word association, Probability.

The problem raised in the present paper deals with the role of reciprocity in complex structures. By definition, a three-entity situation in which all six relations are negative is unbalanced, yet all the relations are reciprocated. A similar three-entity structure in which these six relations are positive is balanced and completely reciprocated, as well. The question which is raised is whether reciprocity is an independent source of cognitive bias. From the results of DeSoto and Kuethe (1959) it would appear that with respect to the liking relationship reciprocity may indeed constitute a source of cognitive bias. Subjects in their experiment estimated the probability of reciprocation of the liking relation to be .74. In a further experiment by DeSoto (1960), Ss took longer to learn a hypothetical social structure characterized by absence of reciprocity than one in which all relations were reciprocated. It was not clear from the results of either experiment, however, if these learning effects were due to reciprocity alone or to balance, since the structures employed by these researchers differed from one another not only in terms of reciprocity but in terms of structural balance as well.

AD-609 010 Div. 28, 23
OTS Prices: HC $3.00/MF $0.75

Educational Testing Service, Princeton, N. J.
GROWTH STUDY. I. ADOLESCENT BEHAVIOR AND INTERESTS,
by Milton H. Maier and Scarvia B. Anderson. Oct 64, 90p RB-64-52
Contract Nonr221400, Proj. NR151 174
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Adolescents, Behavior), (*Psychometrics, Adolescents), Students, Education, Culture, Apptitude tests, Sociometrics, Test methods, Correlation techniques.

The Background and Experience Questionnaire (BEQ) was developed to measure orientations of high school students toward either the adolescent or the adult culture. Both the type of behavior (TV viewing, reading, and activities) and the level of probable cognitive demands (high, medium, and low) were included in deriving the scores to measure orientations. Scores were also obtained to measure school interests, plans for the future, amount of study, part-time work, home background, and certain topics of thoughts and conversations. The BEQ was administered to a nationwide sample of high school seniors. Subsamples of 260 boys and 210 girls were used for a preliminary analysis, and the results in this report are based on these subsamples. The high-level scores were positively correlated with measures of academic aptitude, socioeconomic status, interest in academic school courses, and level of plans for the future. The low-level scores were either inversely related to or uncorrelated with these measures. The values of the correlations of the medium-level scores were in between those of the high- and low-level scores. The scores from the same level of probable cognitive demands had positive intercorrelations, whereas the high- and low-level scores had either negative or near zero correlations. Predictions about the relationships between experiences outside of the classroom and measures of intellectual development are derived from an interactionist point of view of cognitive growth. (Author)

AD-609 050 Div. 28
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
ABSOLUTE JUDGMENTS OF LIGHT INTENSITY.
Final rept. for Aug 63-Jul 64,
by Richard E. Wienke. Oct 64, 14p
Proj. 7183, Task 718302
AMRL TR64 103
Unclassified report

Descriptors: (*Visual perception, Light), (*Light, Visual perception), Adaptation(Physiology), Visual acuity, Reaction (Psychology), Vision, Physiology, Luminescence, Perception (Psychology), Perception, Psychophysiology, Intensity, Human engineering, Optical

properties, Thresholds (Physiology), Illumination, Optics, Visibility, Acuity.

The assumption was made that absolute judgments of luminance could be made providing the eye remained in a relatively constant state of dark adaptation during the judgmental process. This hypothesis was tested by presenting each of twelve naive subjects with a preselected, random series of five stimuli which ranged from stellar magnitude 2.30 to 5.33. Each subject made 200 judgments at the approximate rate of three per minute. Results indicated two stimuli lying about 0.90 steller magnitudes apart were confused, but near certainty of discrimination occurred when two stimuli were separated by approximately 1.40 steller magnitude. (Author)

AD-609 089 Div. 28, 18
OTS Prices: HC $2.00/MF $0.50

Oklahoma Univ. Research Inst., Norman.
TOWARD A PSYCHOLOGICAL INDEX OF WEAPONS EFFECTIVENESS. PART I: FIELD STUDIES,
by R. A. Terry. Dec 64, 38p OURI-TR-1419-5
Contract AF08 635 3693
Unclassified report

Descriptors: (*Weapons, Military psychology), (*Military psychology, Weapons), (*Psychometrics, Military personnel), (*Reaction (Psychology), Weapons), Fear, Emotions, Behavior, Bombs, Artillery, Warfare, Casualties, Prisoners, Enemy personnel.

To compare non-nuclear weapons with respect to their psychological effectiveness requires a scaling procedure which allows numbers to be assigned to these weapons or to their characteristics according to some rule. A broad working definition of the psychological index, therefore, is: A scaling procedure permitting quantitative description of the psychological effectiveness of weapons. The general form of the Psychological Index, therefore, includes measures of psychophysical, psychological, and psychosocial effects of weapons.

AD-609 101 Div. 28
OTS Prices: HC $1.00/MF $0.50

New York Univ., N. Y.
ENCODING IN THE PERCEPTUAL (VISUAL) SERIAL POSITION EFFECT,
by Murray Glanzer. Dec 64, 20p
Contract DA49 193MD2496
Unclassified report

Descriptors: (*Visual perception, Verbal behavior), (*Verbal behavior, Recall), (*Psychometrics, Perception (Psychology)), Performance (Human), Language, Visual signals, Reaction (Psychology), Reflexes, Performance tests, Statistical analysis.

On the basis of the verbal loop hypothesis, specific changes in the shape of the perceptual serial position curve were predicted as a function of encoding, or verbalization, length of the stimulus, and stimulus exposure time. It was also decided to explore the effects of post-stimulus delay, both with and without an interpolated task. Using eight-place binary numbers, a group of twelve subjects was tested to evaluate the effect of these four variables--verbalization length, exposure time, delay time, and interpolated task during the delay. It was demonstrated that, as predicted, increasing the verbalization length and shortening the exposure time have similar effects. They tilt the serial position curve up on the right. The presence of an interpolated task produces an overall increase without, however, any effect on the shape of the serial position curve. Post-stimulus delay, within the range used in this study, produces no clear or systematic effect. (Author)

AD-609 110 Div. 28
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
DYNAMICS OF SOCIAL INFLUENCE.
Annual rept. no. 6, Nov 63-Nov 64,
by Bertram H. Raven. Nov 64, 15p
Contract Nonr23354, Proj. NR171 350
Unclassified report

See also PB-159 694.

Descriptors: (*Social psychology, Attitudes), (*Attitudes, Social psychology), Group dynamics, Reaction (Psychology), Reflexes, Conditioned reflex, Behavior, Performance (Human), Performance tests, Males, Females, Reasoning, Social communication, Sociometrics, Psychometrics, Least squares method, Analysis of variance, Programming (Computers).

The earlier study on the relationships between belief and attitudes reported in Technical Report No. 6 has been replicated with 360 Ss. Variations were introduced in the order in which various elements were rated and a least square analysis was utilized. The earlier results again obtained. However, it appears that ratings of characteristics of the objects on both the A-scale and the B-scale are a function of the sex of the subjects as well as the order in which the characteristics were presented for rating. Also these differences were reflected in the obtained attitude scores toward the object and the correlations between predicted and obtained attitude scores.

AD-609 111 Div. 28
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
SOCIAL INFLUENCE AND POWER,
by Bertram H. Raven. 4 Dec 64, 13p
Contract Nonr23354, Proj. NR171 350
Unclassified report

This article will appear in 'Readings in Contemporary Social Psychology,' ed. by I. D. Steiner and M. Fishbein, New York, 1965.
Rept. on Proj. 'Dynamics of Social Influence.'

Descriptors: (*Social psychology, Attitudes), (*Behavior Social psychology), (*Group dynamics, Power), Reaction (Psychology), Personality, Motivation, Social sciences, Culture.

Social influence is defined here as change in a person's cognition, attitude, or behavior, which has its origin in another person or group. The investigators are interested in such phenomena as: The policeman influences the motorist to move his car; the teacher influences the student to use a specified method in solving a mathematical problem; the mother influences her child to avoid playing in the street; the flying saucer fancier influences his friend to 'see' a flying saucer in a fuzzy cloud formation. Others have considered these situations in terms of 'imitation,' 'suggestion,' 'persuasion,' or 'contagion.' The word 'power' is used to mean potential influence--or, conversely, influence is kinetic power. This paper develops further an approach to the analysis of social influence and power which was first presented in a joint

paper with J. R. P. French, Jr. (French and Raven, 1959). A number of studies, many of which grew out of other theoretical orientations, are presented to illustrate the usefulness of the present conceptualization. (Author)

AD-609 112 Div. 28, 23
OTS Prices: HC $1.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
RESEARCH ACTIVITIES ON PERFORMANCE IN ARMY MONITOR SYSTEMS,
by J. G. Tiedemann. Oct 64, 23p
Proj. 2J024701A723
APRO TRR1139

Unclassified report

Descriptors: (*Monitors, Operators (Personnel)), (*Performance tests, Attention), (*Performance (Human), Army research), (*Army personnel, Operators (Personnel)), Human engineering, Communication systems, Communication theory, Simulators, Laboratory equipment, Reaction (Psychology), Behavior, Military psychology.

Activities were designed to meet two related research requirements: (1) to develop general principles and techniques leading to work methods through which to improve the performance of monitoring functions in a variety of Army jobs; and (2) to improve performance of information monitoring personnel within the U. S. Army Security Agency. As the concept of the problem broadened, the objectives of identifying and evaluating those factors tending to raise or lower the level of monitor performance were added. The current program is one of applied research based on simulation of relevant aspects of monitor jobs in a laboratory setting and is organized about three major areas--the nature of monitoring behavior, determinants of monitor performance, and correlates of monitor performance. Laboratory experimentation is conducted in which the effects on performance of factors associated with signal, task, environment, and the individual are studied in various combinations. The vigilance laboratory completed late in FY 1964, houses an electronic simulator through which the relevant features of monitor jobs can be systematically varied. The present report reviews the highlights of five studies conducted by the Task. (Author)

AD-609 113 Div. 28
OTS Prices: HC $2.00/MF $0.50

California Univ., Los Angeles.
THE EFFECTS OF EXPERT AND REFERENT INFLUENCE ON VERBAL ORIGINALITY.
Technical rept. no. 14,
by Lewis Jerome Ellenhorn. 13 Jul 64, 49p
Contract Nonr23354, Proj. NR171 350

Unclassified report

Rept. on 'Dynamics of Social Influence.'
Doctoral thesis.
Legibility of this document is in part unsatisfactory.
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Descriptors: (*Social psychology, Verbal behavior), (*Verbal behavior, Social psychology), Reaction (Psychology), Reflexes Perception (Psychology), Word association, Behavior, Personality, Performance tests, Attitudes, Group dynamics, Psychometrics, Analysis of variance.

The present study intended to test the hypothesis that the reduction of originality attributed to the addition of social others was the result of a pressure to respond and a focus of attention on the overt act of responding. It was further hypothesized that when subjects worked with those perceived as comparable to themselves, they would develop and 'inferred mutually competitive set' and would concentrate on doing just better than the other. When working with others perceived as superior to themselves, subjects would attempt to respond in an imitation of the superior person's mode of responding. Thus, if the superior person responds quickly, the subject will tend to respond quickly. If the superior person responds slowly, the subject will also respond slowly. When confronted with a co-worker perceived as inferior in ability, the subject will not wish to use the other either as a model or as a basis for self-evaluation. Thus, the subject is not likely to be influenced to respond in the direction of the speed of a co-working social other. In terms of originality, it is hypothesized that the subjects who are co-working with fast responding social others will produce less original responses than subjects co-working with slow responding others. (Author)

AD-609 201 Div. 28
OTS Prices: HC $4.00/MF $0.75

Washington Univ., Seattle.
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART V: MEASUREMENT AND PREDICTION,
by Fern Thomas and Helen Ranck. Dec 64, 103p
Contract Nonr47733; Grant PHS MH00743 08

Unclassified report

See also AD-608 935.

Descriptors: (*Psychology, Measurement), (*Psychometrics, Reliability), (*Test construction (Psychology), Psychometrics), Mathematical prediction, Statistical analysis, Factor analysis Equations, Analysis of variance, Correlation techniques, Behavior, Sampling, Performance (Human).

The research presented is one part of a series of reports on psychological measurement. In this chapter the subject of test specificity is considered systematically and in great detail. The statistical concepts involved and the procedures for estimating quantitatively the specificity of a test are also discussed.

AD-609 251 Div. 28
OTS Prices: HC $1.00/MF $0.50

Harvard Univ., Cambridge, Mass. Committee on Programmed Instruction.
DECISION MAKING WITH FREE OPERANT RESPONSES,
by William C. Holz. Jun 64 24p
Contract AF19 628 2404, Proj. 7682, Task 768204
ESD TDR64 449

Unclassified report

Descriptors: (*Decision making, Psychometrics), (*Learning, Decision making), (*Human engineering, Decision making), Behavior, Reaction (Psychology), Conditioned reflex, Performance (Human), Students, Performance tests.

These experiments explored the suitability of free operant techniques in the investigation of choice behavior and decision making. Young adults were the subjects. Two response manipulanda were available, and points were intermittently scheduled in different proportions for each. The number of points at the end of the session determined the subjects' payment. The schedule by which the points could result was the independent variable, and the relative frequency of the two responses, which represented the subject's choice, was the dependent variable.

When the points were scheduled randomly in time the anticipated result on the basis of previous findings was that the relative frequency of response would match the relative frequency of points. The observed result did not clearly follow this pattern. Over the period studied, the pattern was one of approximately equal responding to both choices regardless of the relative frequency of points obtained. In two similar experiments the points were scheduled randomly in time, but a requirement was added that responses must be spaced at two second intervals to produce a point. The purpose of this experiment was to determine if reducing the high rate of response observed in the previous experiment would lead the relative frequency of response to conform with the expected pattern. Under these conditions, the results closely approximated the matching model. (Author)

AD-609 282 Div. 28
OTS Prices: HC $2.00/MF $0.50

Louisville Univ., Ky.
VIGILANCE FOR AUDITORY INTENSITY CHANGES AS A FUNCTION OF PRELIMINARY FEEDBACK AND CONFIDENCE LEVEL,
by Michel Loeb and John R. Binford. Dec 64
34p
Contract DA49 193MD2197

Unclassified report

Descriptors: (*Attention, Auditory perception), (*Auditory perception, Performance tests), Auditory signals, Feedback, Conditioned reflex, Monitors, Performance (Human), Noise, Reaction (Psychology), Intensity, Probability, Least squares method.

Forty-eight subjects were asked to respond to occasional increments in a pulse train with ratings of certainty of signal occurrence for 20 minutes. Half (F) subjects were given feedback; half (NF) were not. In a second session all responded during an 80-minute period with a simple response. In another, half responded with certainty ratings; half responded with a simple response. Finally, those who had responded with ratings responded simply and those who had employed a simple response made ratings. It was found that F subjects made fewer false responses and tended to mae fewer detections in earlier sessions. In later sessions false responses were reduced for all. The usual progressive false response and detection reductions and latency increases were noted; when subjects employed ratings, reductions in certainty were noted within sessions. It was concluded that the data support the detection theory model for vigilance for this type of tas. (Author)

AD-609 317 Div. 28
OTS Prices: HC $1.00/MF $0.50

Cincinnati Univ., Ohio.
THE EFFECT OF TEST TRIALS ON THE LEARNING OF PAIRED ADJECTIVES.
Final rept. for Jul 63-Aug 64,
by Kirk A. Johnson. Oct 64, 23p
Contracts AF33 657 10234, AF33 615 1046,
Proj. 1710, Task 171007
AMRL TR64 105

Unclassified report

Descriptors: (*Learning, Performance tests), (*Performance tests, Learning), (*Retention, Performance tests), (*Word association, Learning), Feedback, Reaction (Psychology), Psychometrics, Recall, Verbal behavior, Astronautics, Training devices, Psychology, Test methods, Statistical analysis.

Three experiments were conducted to determine the extent to which blocks of test trials contribute to the learning of paired adjectives. The results were compared to those found in an earlier study of the relative effectiveness of various modes of the Subject Matter Trainer. The earlier study indicated that learning by means of the Quiz Mode under conditions in which blocs of trials in the Quiz Mode were alternated with blocks of test trials, was considerably superior to learning by means of several other modes, none of which involved test trials. In the present experiments, it was found that the addition of blocks of test trials to blocks of learning trials led to improvements in learning. This was true whether learning was by means of prompting or anticipation trials. The improvements were comparable in magnitude to the trial-by-trial differences found between the Quiz Mode and two of the remaining modes used in the previous study. Apparently, much of the trial by trial advantage of the Quiz Mode in the earlier study was due to the use of test trials interspersed between learning trials. Other evidence however, indicates that when subjects are allowed to pace theselves, the Quiz Mode will lead to a considerably greater amount of learning in a given time than any of the other modes of the Subject Matter Trainer. (Author)

AD-609 358 Div. 28
OTS Prices: HC $3.00/MF $0.75

Naval Training Device Center, Port Washington, N. Y.
PERCEIVED BRIGHTNESS OF LIGHT FLASHES.
Doctoral thesis,
by Milton S. Katz. 3 Aug 64, 62p
NAVTRADEVCEN IH16

Unclassified report

Research performed as part of degree requirements Univ. of Rochester and Research sponsored under a grant from the Public Health Service.

Descriptors: (*Sensory perception, Brightness), (*Brightness, Sensory perception), Human engineering, Training devices, Adaptation (Physiology), Stimulation, Light, Perception (Psychology), Thresholds (Physiology), Performance tests, Vision, Visual acuity.

A psychophysical investigation of some aspects of the Broca-Sulzer effect was conducted by means of an optical system designed to provide contiguous uniocular or separate binocular brightness comparisons of brief flashes superimposed on a constant luminance adapting field. The data lend support to the conclusion that flash duration giving the greatest brightness is long at low luminance, becomes progressively briefer as luminance increases, but then grows longer again as luminance increases to very high levels, following the change in amount of effect, which increases to a maximum, and then decreases as luminance increases. (Author)

AD-609 368 Div. 28, 23
OTS Prices: HC $1.00/MF $0.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
HUMAN ENGINEERING IN THE DESIGN OF INSTRUCTIONAL SYSTEMS,
by Sylvia R. Mayer. Sep 64, 19p
Proj. 7682, Task 768204
ESD TDR64 454

Unclassified report

Descriptors: (*Human engineering, Training devices), (*Teaching machines, Human engineering), Education, Instructors, Students, Learning, Decision making, Performance (Human), Display systems, Reliability, Design.

A conceptual model is proposed for the use in the application of human engineering principles and techniques to the design of instructional systems. The trainee and instructor are viewed as operators within an information system. To illustrate this model and its application, examples are drawn from the literature and from current research on instructional systems. A preliminary human engineering guide is outlined which presents factors critical to design decisions for instructional systems. The model and guide attempt to counteract current tendencies toward premature standarization of instructional system structure, and to bring instructional system development into the main stream of the applied science of human engineering. (Author)

AD-609 377 Div. 28, 15
OTS Prices: HC $3.00/MF $0.75

Institute for Research, State College, Pa.
PURPOSIVE SYSTEMS THEORY AND APPLICATION.
Final rept.,
by H. Edward Massengill, Jr. Jul 64, 97p
Contract AF19 628 2968, Proj. 4690, Task 469003
ESD TDR64 531
Unclassified report

Descriptors: (*Behavior, Decision theory), (*Decision making, Decision theory), (*Decision theory, Decision making), Performance (Human), Theory, Reasoning, Optimization, Game theory, Dynamic programming, Learning, Psychology, Probability, Abstracting.

The purpose of this paper is to summarize the approach and theory on which the research performed is based. Basically, the approach is the use of decision theory, with the assumption that people behave optimally given their formulations and constraints, to study the significant tasks that people perform. The ultimate goal of the approach is to map human behavior onto logic and mathematics. The emergence of the approach is given along with four basic requirements that we make of any theory to be used in understanding the behavior of individuals. The approach is contrasted with more traditional approaches. The procedure of the approach, task analysis, is explained and is illustrated by examples from the contract research. The place of applications in the approach is dealt with extensively. The paper includes a guide to the more important ideas dealt with in the contract research with references to the relevant contract publications. Abstracts of these publications, seven completed and seven in preparation, are also included. (Author)

AD-609 398 Div. 28
OTS Prices: HC $3.00/MF $0.75

Washington Univ., Seattle.
PSYCHOLOGICAL MEASUREMENT AND PREDICTION.
PART VI. SPECIAL TOPICS,
by Paul Horst. Dec 64, 94p
Contract Nonr47733; Grant PHS MH00743 08
Unclassified report

See also AD-609 201.

Descriptors: (*Psychometrics, Test construction (Psychology)), (*Test construction (Psychology), Psychometrics), Psychology, Measurement, Intelligence tests, Reliability, Performance (Human), Analysis of variance, Factor analysis, Matrix algebra, Statistical analysis.

This is one part of a series of reports on psychological measurement. It is hoped that these reports may further the synthesis and integration of psychometrics and psychological scaling. The problems and methods of item analysis are discussed. Single index and dual index types of item analysis, as well as item analysis procedures for items having no best answers are considered. The administration of tests for item analysis purposes is discussed. The effects of speededness on test score statistics, the construction and scoring of speeded tests, and the administration of no-correct-answer type tests are considered systematically. The effects of sample selection on statistics is evaluated. A partial treatment of psychological processes as a function of age is given.

29. Quartermaster Equipment and Supplies

AD-609 206 Div. 29, 12, 27
OTS Prices: HC $6.00/MF $1.25

Chance Vought Corp., Dallas, Tex.
INTEGRATED BACK-PACK MANEUVERING UNIT PROPULSION STUDY AND EXHAUST PLUME HEATING ANALYSIS.
Astronautics engineering rept. for Dec 62-Jun 63,
by C. L. Pratt and F. H. Goodnight. Sep 63, 237p
CVC-00.252
Contract AF33 657 10408, Proj. 8170, Task 817008
ASD TDR63 729
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Astronauts, Spaceborne), (*Rocket motors (Liquid propellant), Portable), (*Flight clothing, Space navigation), (*Space propulsion, Flight clothing), Feasibility studies, Monopropellants, Hydrogen peroxide, Exhaust gases, Heat transfer, Space environmental conditions, Halojenated hydrocarbons, Specific impulse, Performance (Engineering), Gas generating systems, Military personnel, Rocket propulsion, Weight Manuverability.

Two technical problems related to the Astronaut Maneuvering Unit are treated. The problems are: (1) heating associated with the impingement of the rocket exhaust on space suit surfaces, and (2) the performance of inert heated gases as propellants. Methods for predicting rocket exhaust heating rates in space are presented and results are compared with test data. Effects of plume heating of an H2O2 monopropellant exhaust from a typical motor placement is summarized. The results obtained from several heated gas propellant tests are reported and compared to theoretically predicted performance. The analytical and experimental techniques utilized are discussed in detail. The refrigerants, Freon 115 and Freon C318 show the highest density impulse and lowest weight. Freon 115 is recommended for use due to the lower storage temperature required. (Author)

30. Research and Research Equipment

AD-608 923 Div. 30, 32
OTS Prices: HC $1.00/MF $0.50

Braddock, Dunn, and McDonald, Inc., El Paso, Tex.
DOVE DATA STORAGE AND RETRIEVAL SYSTEM.
Final rept.
by Daniel F. McDonald, James D. Freeman, and Carlos B. Uzeta. Oct 64, 24p DU-6345
Contract AF30 602 3192
RADC TDR64 307

Unclassified report

Descriptors: (*Data storage systems, Semiconductor films), (*Information retrieval, Data storage systems), Computer storage devices, Electron beams, Foils, Metal films, Electron guns, Vacuum apparatus, Control panels, Equations.

Research was conducted on a technical program demonstrating the feasibility of the Dove Data Storage and Retrieval System. This electronic system makes possible high-speed and high-density storage (and subsequent retrieval) of digital information on recording media such as thin metallic foils or semi-conductor films. The heart of the system is an electron beam tube which produces a spot size of five microns at the recording surface by magnetically focusing the beam. Electrostatic deflection is employed to position the beam wherever required. High-speed accessibility for read-out operations can be accomplished by special circuitry. The device is a rugged and completely demountable unit. (Author)

AD-608 926 Div. 30
OTS Prices: HC $3.00/MF $0.75

MRD Div., General American Transportation Corp., Niles, Ill.
INVESTIGATION OF FATIGUE FAILURE DETECTION SYSTEMS USING INFRARED TECHNIQUES.
Final rept. for 11 Jun 62-30 Aug 63,
by G. Schmitz and M. Levine. Oct 64, 68p MR-1204
Contract AF33 657 8828, Proj. 4437, Task 443706
RTD TDR63 4293

Unclassified report

Descriptors: (*Infrared detectors, Sonic fatigue), (*Sonic fatigue, Infrared detectors), (*Fatigue (Mechanics), Sonic fatigue), Non-destructive testing, Metal plates, Infrared radiation, Radiometers, Thermal conductivity, Structural parts.

The purpose of the program was to determine the applicability of a noncontracting infrared detection system for use with fatigue specimens in the sonic test facility. The breadboard model of a detection system was constructed. The system used a radiative heat source and an infrared radiometer to detect changes in the heat transfer characteristics due to fatigue flaws in structural metals. Tests of the system were performed on artificial and actual flaws. The system proved able to detect the larger fatigue failures. These results demonstrate the feasibility of the system and further investigation with the construction of a prototype system is recommended. (Author)

AD-608 927 Div. 30
OTS Prices: HC $5.00/MF $1.00

RIAS, Inc., Baltimore, Md.
NONLINEAR SYSTEM ANALYSIS AND SYNTHESIS. PART I. STUDY OF LYAPUNOV FUNCTIONS FOR PROBLEMS OF CONTROL AND OF OPTIMALITY OF LINEAR SYSTEMS,
by R. E. Kalman, G. P. Szego, and T. S. Englar.
Oct 64, 168p
Contract AF33 657 8559, Proj. 8225, Task 822501
FDL TDR64 58 P1

Unclassified report

Descriptors: (*Control systems, Mathematical analysis), (*Functions, Control systems), Nonlinear systems, Linear systems, Dynamics, Stability, Differential equations, Polynomials, Adaptive control systems, Optimization, Theorems, Systems engineering.

Research covered in this report may be broken into four parts. I. Lyapunov Function for the Problem of Lur'e in Automatic Control. This problem is completely resolved by giving conditions for the existence of a Lyapunov function and an algorithm for its construction. II. On Polynomial Lyapunov Function. A preliminary study of the use of polynomial Lyapunov functions in the study of stability, with particular attention to possible computational utilization. III. When is a Linear Control System Optimal. Discussion of the problem: Given a control law, for what performance indices is it optimal. This treatment involves the use of frequency domain techniques. IV. ASP Modifications. A description of changes and proposed changes in the ASP Program. This program is more completely described in ASD-TR-61-27, Volume I and II. (Author)

AD-608 963 Div. 30, 26
OTS Prices: HC $2.00/MF $0.50

Friez Instrument Div., Bendix Corp., Baltimore, Md.
ML-419 THERMISTOR P.E.M.
Final engineering rept. for 1 Jan 63-31 Aug 64,
by J. T. George and F. D. DeMarco. 31 Aug 64, 50p
Contract DA36 039AMC01465E

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermistors, Manufacturing methods), (*Temperature sensitive elements, Manufacturing methods), Resistors, Quality control, Specifications, Material forming, Tests, Production, Materials, Performance (Engineering).

The report provides a history of the ML-419 P.E.M. program. The problems encountered, and the means of solving these problems are discussed. Thermistor materials, manufacturing processes, and production equipment are described in detail. Test data are presented for all phases of the program. A Quality Control Manual detailing pertinent inspection and quality control information is included. (Author)

AD-608 970 Div. 30, 16, 28
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
COMMUNICATION BY ELECTROENCEPHALOGRAPHY,
by E. M. Dewan. Nov 64, 12p
Proj. 5635
AFCRL 64 910; AFCRL SR12

Unclassified report

Prepared in cooperation with Stanley Cobb Labs. for Psychiatric Research, Massachusetts General Hospital Boston.

Descriptors: (*Electroencephalography, Control systems), (*Control systems, Electroencephalography), Control, Vision, Feasibility studies, Communication systems.

The alpha rhythm can be blocked by visual concentration to control an electric switch at will. This could in turn be used for purposes of control or communication directly via EEG signals--in other words, by thought manipulation. Although practical applications of this idea have yet to be investigated, the actual demonstration of a thought-controlled device is in itself of interest. (Author)

AD-608 977 Div. 30, 4, 16
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
MASS SPECTROMETRIC DETERMINATION OF THE ALIPHATIC AND AROMATIC CONTENT OF A HYDROCARBON MIXTURE.
Final rept.,
by Fred E. Saalfeld. 12 Nov 64, 10p
Proj. RR001 01 43 4804
NRL 6178

Unclassified report

Descriptors: (*Mass spectroscopy, Hydrocarbons), (*Aliphatic compounds, Quantitative analysis), (*Aromatic compounds, Quantitative analysis), (*Hydrocarbons, Mass spectroscopy), (*Air pollution, Closed ecological systems), Submarines, Atmosphere, Poisonous gases, Vapors, Toxic tolerances, Spectrum analyzers, Samplers, Ionic current, Excitation.

A simplified mass spectrometric technique was devised for determining the aromatic content in hydrocarbon mixtures of the type that have been recovered from adsorptive carbon samplers exposed in the atmospheres of nuclear submarines. The method is based on the summation of ion currents at mass-to-charge ratios (m/e) of 27, 28, 28, 41, 43, and 57 for aliphatic hydrocarbons and 39, 51, 52, 77, 78, 91, 92, 105, 106, 119, 120, 133, and 134 for aromatic hydrocarbons. The mass spectrometric results agree reasonably well with the Fluorescence Indicator Adsorption analyses of the same samples. While, due primarily to cost and operational complexity, no available mass spectrometers are suitable for shipboard operation, future developments in the field of mass spectrometry should be carefully observed for advances that make such use possible. (Author)

AD-608 983 Div. 30
OTS Prices: HC $1.00/MF $0.50

Warner and Swasey Co., Flushing, N. Y.
INFRARED TECHNIQUES FOR AIR TEMPERATURE MEASUREMENTS IN A HYPERSONIC WIND TUNNEL.
Final technical rept.,
by Gunter J. Penzias, Richard H. Tourin, and Stanley A. Dolin. Oct 64, 24p
Contract AF33 616 8319, Proj. 7065, Task 7065 02
ARL 64 170

Unclassified report

Descriptors: (*Radiation pyrometers, Infrared research), (*Infrared spectroscopy, Radiometers), (*Pyrometers, Hypersonic wind tunnels), (*Hypersonic wind tunnels, Infrared research), High-temperature research, Air, Flames, Monochromatic light, Wind tunnels.

Infrared spectroradiometric techniques were developed for measurement of high gas temperatures with microsecond time resolution. Procedures for using a high speed monochromatic radiation pyrometer were established, and temperatures in gaseous detonations were measured to determine instrument performance. Breadboard modifications were made to the high speed pyrometer to enable its use for measuring air temperatures in the Mach 20 Hypersonic Wind Tunnel at the Aeronautical Research Laboratories, Wright-Patterson Air Force Base, Ohio. The temperature measuring technique was demonstrated at ARL by measuring the temperature of a propane-air flame at atmospheric pressure with the high speed infrared pyrometer installed on the wind tunnel. The flame was located in the test cabin and the measured temperature was 2050K. Applications of the pyrometer to temperature measurement in the settling chamber and in the test cabin directly in front of the model in the Mach 20 wind tunnel were considered. (Author)

AD-609 005 Div. 30
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 2. DATA SYSTEMS.
Quarterly progress rept. for 1 Aug-31 Oct 64.
15 Nov 64, 25p
Contract AF19 628 500

Unclassified report

Descriptors: (*Data processing systems, Computers), (*Computers, Data processing systems), Circuits, Switching circuits, Transistors, Computer storage devices, Electronics, Analog-digital computers, Design, Control, Information retrieval, Magnetic tape, Aluminum, Oxides, Diodes, Triodes.

Contents: Digital Computers: Computer Systems--curve-drawing scope, optical input, multiuser consoles, symbolic page-address transformation; Circuit Development--integrated circuits, UHF switching transistors, transistor flip-flop memory; Magnetic Film Engineering--clean room, pattern scribing, magnetic film characteristics, content-addressed memory, large-capacity memory tester, circuit design, page-address memory; System Programming Applications--class-oriented ring associative language, variably initialized translator for algorithmic languages; Computer Components: Magnetic Films--anisotropy, magneto-optics, ternary alloys; Electron Transport--Al-Al2O3 diodes and triodes, contact potential during Al2O3 growth, Film-Memory Sense Amplifiers; Psychology: Automatic Procedure Executor; Human Information Processes--recognitive behavior, unidimensional similarity, signal detection, perceptibility and memorability; and Control Research: On-Line Data Storage, Retrieval, and Editing; Hybrid Computer Development; Estimation and Control Theory.

AD-609 102 Div. 30, 12
OTS Prices: HC $2.00/MF $0.50

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
ACOUSTIC AND VIBRATION DATA PROCESSING AND ANALYSIS SYSTEM TITAN SILO-LAUNCH PROGRAM.
Aug 60, 42p BBN-711

Unclassified report

Descriptors: (*Silos, Data processing systems), (*Acoustics, Guided missiles (Surface-to-surface)), (*Vibration, Guided missiles (Surface-to-surface)), (*Data processing systems, Silos), Air Force, Electronic recording systems, Electronic equipment, Launching.

The processing and analysis of acoustic and vibration data is best performed with specialized data processing equipment which was not available at the inception of the program. Bolt Beranek and Newman Inc. was requested

by Space Technology Laboratories to design, construct, and operate the necessary system to process and analyze the data from three test locations. Such a system, the Acoustic and Vibration Data Processing and Analysis System, has been completed and is described in this report. It is composed principally of purchased equipment, although items that were not otherwise available were provided by Bolt Beranek and Newman Inc.

AD-609 119 Div. 30
OTS Prices: HC $6.00/MF $1.25

Space General Corp., El Monte, Calif.
RESEARCH ON ELECTROCHEMICAL ADAPTIVE SYSTEMS.
Oct 64, 215p
Contract AF33 657 7930, Proj. 4160, Task 416004
AL TDR64 254
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Bionics, Electrochemistry), Electrodeposition, Nerve impulses, Simulation, Computer storage devices, Electrical properties, Signals, Propagation, Density, Programming(Computers), Spheres, Materials, Cybernetics.

Results of experimental and theoretical research are given which pertain to the possibility of achieving unprecedented packing densities and complexities in adaptive machines through the development of integrated electrochemical systems. Two basic physical phenomena are involved primarily and are being joined together: (1) signal propagation by electrochemical waves which intrinsically duplicate all known electrical properties of a nerve impulse, and (2) plastic connectivity (and, hence, 'memory') through metallic dendrite growth formed by electrodeposition. The major key (or, perhaps, stumbling block) to ultrahigh density and complexity is programming or structuring access, and it is in this respect that electrochemical systems may have a distinct advantage over contemporary electronic component technology. This unique possibility comes from an intrinsic material property of the 'active' material, namely, precipitous but temporary drop in surface resistance following excitation which, it is believed, will make possible trial-and-error adaptive programming with the aid only of properly coordinated massive or peripheral shocks. (Author)

AD-609 134 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INSTRUMENT FOR RELATIVE MEASUREMENTS OF THE ACCELERATION OF THE FORCE OF GRAVITY,
by V. A. Romanyuk. 13 Nov 64, 6p
FTD TT64 239; TT 65 60429
Unclassified report

Unedited rough draft trans. of Russian patent 156693, appl. 722516/26-10, 21 Mar 61.

Descriptors: (*Patents, Acceleration), (*Gravity, Acceleration), (*Acceleration, Measurement), USSR, Oscillation, Fittings.

The object of the invention is an instrument for relative measurements of the accelerations of the force of gravity by eans of non attenuating oscillations of pendulums on elastic suspensions with the center of gravity lower than their axis of rotation, which is distinguished by the fact that for the purpose of decreasing the unsteadiness of the stand and increasing the precision of the measurements it is provided with a mechanism for fastening with a metallic frame or fittings mounted in a stone monolith and rigidly fastened with an elastic suspension of the pendulum in a plane.

AD-609 138 Div. 30, 8, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HIGH-VACUUM ION SOURCE,
by M. B. Pyt'eva, G. V. Spivak, and E. M. Dubinina.
23 Nov 64, 9p
FTD TT64 639; TT 65 60433
Unclassified report

Unedited rough draft trans. of Zhurnal Tekhnicheskoi Fiziki (USSR) 1964, v. 34, no. 1, p. 142-145.

Descriptors: (*Ion sources, Electron beams), (*Vacuum, Ion sources), Electron guns, Electric fields, Magnetic fields, Design, Cathodes (Electron tubes), Oxides, USSR.
A high-vacuum ion source based on the extraction of an ion flow from the region of the electron beam of high density is described. Under a residual gas pressure of 2/.0001 mm Hg and an extracting voltage of V = -400v, ion currents of 80 microamps are obtained. Usually in ion sources in which sufficiently large ion densities can be found, the ion beam is extracted from the plasma of a gas discharge. In the known sources, which work under small gas pressures, the effect of the magnetic field is used, which increases the number of collisions. In this device the electric field is the only effect, and the necessary ionization is ensured by the high density of electrons in the beam.

AD-609 142 Div. 30, 8, 26
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROCEEDINGS OF THE MACHINE-CONTROL INSTITUTE, 1963, NO. 17: SELECTED ARTICLES,
by V. V. Anokhina, V. I. Sergeev, and Yu. V. Lyubatov.
23 Nov 64, 29p
FTD TT64 412; TT 65 60437 Unclassified report
Unedited rough draft trans. of Akademiya Nauk SSSR. Institut Mashinovedeniya. Trudy. Seminar po Tochnosti v Mashinostroenii i Priborostroenii, 1963, no. 17, p. 3-11, 89-97.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Industrial equipment, Reliability), (*Electrical equipment, Reliability), (*Electrical bridges Stability), (Measuring devices (Electrical and electronic), Stability), USSR, Theory, Equations, Differential equations, Nonlinear systems, Nonlinear differential equations, Quality control, Reports.

Contents: (1) Stability in self-balancing bridges by V. V. Anokhina and V. I. Sergeyev, on equations establishing behavior of elements in such a self-balancing electric bridge as one for multiplying scalor quantities (2) Optimization of one scheme for detecting faults, by Yu. V. Lyubatov, on reduction of time in testing and detecting faults in systems of equipment.

AD-609 172 Div. 30, 26
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.

APPARATUS FOR HIGH-PRESSURE RESEARCH,
by V. A. Galaktionov. Jul 64 9p
AmMe+Soc-T-R-448
Contract AF19 628 3880
TT 65 60445

Unclassified report

Issledovatel'skie Apparaty Vysokogo Davleniya, trans. of Akademiya Nauk SSSR. Vestnik, 1962, v. 32, no. 7, p. 73-76.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*High-pressure research, Laboratory equipment), Hydrostatic pressure, Hydraulic pressure pumps, Pistons, Test equipment, Manufacturing methods, USSR.

AD-609 173 Div. 30, 14
OTS Prices: HC $2.00/MF $0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DESIGN MODIFICATIONS OF A FRICTION TEST RIG FOR HIGH VACUUM AND ELEVATED TEMPERATURE OPERATION.
Rept. for Mar 62-Mar 63,
by L. E. Wieser. Oct 64, 33p
Proj. 7343, Task 734302
ML TDR64 261

Unclassified report

Descriptors: (*Friction, Test equipment), (*Test equipment, Friction), Vacuum apparatus, High-temperature research, Design, Loading (Mechanics), Test methods, Lubrication, Space environmental conditions, Theory, Calibration, Lubricants, Films, Life expectancy.

This program deals with the parametric evaluation of wear-life factors, friction coefficients, and a search for dry film lubricant materials for lubrication of bearings operable in vacuum and elevated temperature environments. One of the most critical factors in the use of dry film lubricants in vacuum and at elevated temperatures is their wear-life. Normally, one also finds that low friction is mandatory, with an ideal maximum of about 0.1 for the friction coefficient. This report describes the mechanical components, and operation of a friction tester, design highlites, calibration and measuring methods, and theoretical background of the involved physical forces of friction and their derivation from a mechanical-electronic measuring system. In order to obtain an acceptable level of measuring accuracy, combined with the flexibility and capability of the test equipment, a number of improvements and modifications were necessary during the reporting time. (Author)

AD-609 217 Div. 30, 2, 25
OTS Prices: HC $1.00/MF $0.50

Lightning and Transients Research Inst., Minneapolis, Minn.
LASER TYPE ULTRA-VIOLET RADIATION FEASIBILITY FOR LIGHTNING AND ATMOSPHERIC PROPAGATION STUDIES.
Final rept., pt. 2,
by J. R. Stahmann. Oct 64, 22p L-T-417
Contract AF19 604 7984, Proj. 8653
AFCRL 64 859 P2

Unclassified report

Descriptors: (*Ultraviolet radiation, Feasibility studies), (*Lasers, Ultraviolet radiation), (*Lightning, Propagation), (*Atmospheric electricity, Propagation), Electromagnetic waves, Antennas, Antenna configurations, Masers, Very low frequency, Plasma jets, Plasma medium, Electric arcs, Carbon arc lamps, Molecules, Air, Ionization, Gas ionization.

The feasibility of a laser type ultra-violet source as a possible substitute for the continuously supported wire antenna, used for artificial atmospheric propagation studies and to trigger lightning for natural lightning channel studies, is considered. The energy required to produce an electron plasma or even a molecular plasma is quite high. A powerful laser beam would provide an intense concentration of energy. However, it is difficult if not impossible to produce lasers with wavelengths below the 1000 A required to ionize air molecules. Laboratory experiments were limited to the use of a 14 kilowatt carbon arc as a source in the far ultra-violet. No long spark diversion similar to that found with a jet plasma (10,000,000 to 100,000, 000 ions/cc) was observed with the carbon arc source. Methods of selective ionization to distribute the ions over the beam with just the density required for the conductivity of a jet plasma include possible rocket distribution of combustible particles to be ignited by a conventional laser beam for distances of several miles to produce islands of plasma which possibly could allow a discharge to propagate by the step by step process of the branch streamer mechanism. (Author)

AD-609 253 Div. 30, 15
OTS Prices: HC $2.00/MF $0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
DECOMPOSITION AND STATE ASSIGNMENT FOR SEQUENTIAL MACHINES,
by Zvi Kohavi. 19 Aug 64, 38p PIBMRI-1231-64
Contract AF49 638 1402

Unclassified report

See also AD-409 277.

Descriptors: (*Digital computers, Networks), Cascade structures, Algebraic topology, Topology, Algebras, Matrix algebra, Set theory, Data processing systems, Factor analysis, Diodes.

A system of sequential machines can be significantly reduced if we find a method of factoring some small machines connected in cascade to other machines and producing the desired response. Necessary and sufficient conditions are developed for two (or more) machines to be cascade decomposable in such a way that both have one common component machine that may be factored and shared by the two machines. To obtain the common machine the concept of implication table is introduced. The implication table is shown to be the state table of the factored machine. It is further shown how machines that do not obey these conditions can be augmented in such a way that the conditions are satisfied and the factoring is possible. The problem of reducing the output circuit is also considered. The main tools in this point are the output consistant partitions and the partitions with substitution property or the partition pairs. The importance of a simplified output circuit is increased in the treatment of multiple-outputs, Mealy-type machines. As a more advanced step, a new concept of partially independent subsets is studied. For machines that do not have any partition with substitution property or partition pairs it is shown how to obtain simpler assignments and output circuits with reduced dependencies by recognizing the partially independent subsets. (Author)

AD-609 255 Div. 30, 12, 20, 25
OTS Prices: HC $6.00/MF $1.25

TRW Space Technology Labs., Los Angeles, Calif.

SPACE PHYSICS INSTRUMENTATION.
Final rept.
31 Dec 60, 223p STL/TR-60-0000-19419
Contract AF04 647 619
AFBMD 61 6; AFBMD 60 104

Unclassified report

Also includes: Semiannual rept. for 1 Jul-31 Dec 59; STL/TR-59-0000-09950; AD-235 218. Semiannual rept. for 1 Jan-30 Jun 60; STL/TR-60-0000-09191.

Descriptors: (*Space flight, Instrumentation), (*Astrophysics, Instrumentation), (*Nuclear physics, Instrumentation), Physics, Spectrum analyzers, Nuclear radiation spectrometers, Pulse height analyzers, Pulse amplifiers Circuits Gates (Circuits), Radiation measurement systems, Protons, Neutrons, Gamma rays, Nuclear explosions.

The properties of some new types of beta-ray spectrometers and proton spectrometers for use in space were studied. A laboratory prototype and a light-weight prototype of a high-energy beta-ray spectrometer were constructed. Tests were performed on these spectrometers as well as the high-energy beta-ray spectrometer reported in STL/TR-59-0000-09950. Support work included construction and testing of a pulse-height analyzer, a linear pulse amplifier a nano-second coincidence circuit and gating circuitry for use in conjunction with the spectrometers. A laboratory luminescent chamber was constructed and tested at the California Institute of Technology's synchrotron. The energy of the primary radiation can usually be determined and a lower energy bound is always possible. Immediate applications include the investigation of the primary radiation near the earth with particular emphasis on gamma rays and neutrons, the detection of atomic or thermonuclear space explosions, the identification of hostile satellites, and certain fundamental high-energy physics experiments.

AD-609 265 Div. 30
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
PRESSURE TRANSDUCER FOR MEASURING SHOCK WAVE PROFILES. PHASE X: MEASUREMENT OF LOW-PRESSURE SHOCK WAVE PROFILES.
Progress rept. nos. 39 and 8, 1-30 Nov 64,
by R. F. Williams and P. H. Moravek. 11 Dec 64, 5p
Contracts DA49 146XZ096, DA49 146XZ280,
Projs. GSU3713, GSU4832

Unclassified report

Descriptors: (*Shock waves, Measurement), (*Test equipment, Shock waves), (*Transducers, Pressure gages), Power supplies, Electrical impedance, Voltage, Temperature, Rectifiers, Thermal conductivity, Circuits.

A protective circuit was designed which reduces the possibility of damage to the piezoresistive element of a transducer due to test discharges of the full measuring current. This modification of the power supply consists of a crowbar circuit which shunts the power supply output with a low impedance at a preset time after power supply trigger.

AD-609 276 Div. 30
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
THE ISOLATION AND CORRECTION OF COMPUTER MALFUNCTIONS,
Memo rept.
by J. N. Warfield. 4 Sep 56, 8p GM-45-64

Unclassified report

Descriptors: (*Digital computers, Malfunctions), (*Maintenance, Digital computers), Corrections, Engineering personnel, Technicians, Computer personnel, Training devices, Packaged circuits, Test methods.

The isolation and correction of malfunctions in most electronic digital computer installations was carried out by engineers. As the number of installations grow this task will gradually be taken over by technicians. In order to make the process of malfunction isolation efficient, it seems desirable to utilize as many training aids and as much specialized equipment as is practical. In addition, one should take advantage of all feasible schemes as alternatives in the process of isolating malfunctions. In this report various factors which influence the isolation process are considered and alternative schemes for isolating and correcting malfunctions are discussed. (Author)

AD-609 288 Div. 30
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
A NEW METHODOLOGY FOR COMPUTER SIMULATION,
by Martin Greenberger. 1964, 30p MAC-TR-13
Contract Nonr410201, Proj. NR048 189

Unclassified report

Rept. on Proj. MAC presented at the Conference on Computer Methods in the Analysis of Large-Scale Social Systems, sponsored by the Joint Center for Urban Studies of the Massachusetts Inst. of Tech. and Harvard Univ. Cambridge, Mass., 19-21 Oct 64.
See also AD-604 681.

Descriptors: (*Computers, Simulation), Special purpose computers, Operations research, Data processing systems, Scientific research.

Computer simulation is a cooperative venture between researcher and information processor, but the processor's role customarily begins too late. The researcher can benefit substantially by bringing the computer up into the earlier, creative phases of the simulation process. An on-line computer system that makes this possible is described. The OPS system is open-ended and modular in a very fundamental sense. The user can add his own parts over a period of days or months as he increases his understanding of his problem. The OPS system is relatively free of rules and formats. The user creates his own language and his own conventions. He has the widest latitude to express his problem in its natural terms and to be inventive. Gradually his system takes on an individual character appropriate to the purpose it is to serve. The user can create his own symbols and his own mapping of common storage by means of standard operators. He can also create his own operators and add them without limit to the set of standard operators supplied to him. Operators are functional subroutines programmed in any language that the computer can compile, such as FORTRAN, MAD, or FAP. OPS-2 provides the user with a simple mechanism for compounding operators or creating K-OP's. A K-OP table in common storage has one line for each operator in the concatenation of operators that the user forms.

AD-609 295 Div., 30, 1, 12
OTS Prices: HC $3.00/MF $0.75

Office of Aerospace Research, Washington, D. C.
1964 ANNUAL REPORT, OFFICE OF AEROSPACE RESEARCH, UNITED STATES AIR FORCE.
1964, 55p
OAR 64 15

Unclassified report

Descriptors: (*Air force research, Reports), (*Scientific research, Air Force), Laboratories, United States, Belgium, Brazil, Logistics, Air force budgets, Scientific personnel, Civilian personnel, Periodicals, Nuclear physics, Chemistry, Mathematics, Electronics, Materials, Mechanics, Geodesics, Astronomy, Astrophysics, Biology, Medical research, Human engineering.

AD-609 296 Div. 30, 32
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
THE MAC SYSTEM: A PROGRESS REPORT,
by R. M. Fano. 9 Oct 64, 26p MAC-TR-12
Contract Nonr410201
Unclassified report

Rept. on Proj. MAC. Paper presented at the Symposium on Computer Augmentation of Human Reasoning, Washington, D. C., 16 Jun 64, and prepared for publication in IEEE Spectrum, Jan. 1965.
See also AD-608 502.

Descriptors: (*Computers, Multiple operation), (*Special purpose computers, Multiple operation), (*Information retrieval, Multiple operation), Real time, Programming (Computers), Programming languages, Data processing systems, Data transmission systems, Systems engineering.

The notion of machine-aided cognition implies an intimate collaboration between a human user and a computer in a real-time dialogue on the solution of a problem, in which the two parties contribute their best capabilities. In order for this intimate collaboration to be possible, a computer system is needed that can serve simultaneously a large number of people, and that is easily accessible to them, both physically and intellectually. The present MAC System is a first step toward this goal. The purpose of this paper is to present a brief description of the current system, to report on the experience gained from its operation, and to indicate directions along which future developments are likely to proceed. (Author)

AD-609 329 Div. 30, 12
OTS Prices: HC $1.00/MF $0.50

Army Missile Command Computation Center, Army Missile Support Command, Redstone Arsenal, Ala.
AN ACCIDENTAL ERROR DETECTION AND CORRECTION SUBROUTINE.
Internal technical note no. 48,
by Charles Ward Upton. 30 Sep 63, 9p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Computer storage devices, Errors), (*Magnetic tape, Errors), (*Programming (Computers), Series), (*Series, Time), Real time, Data, Reduction, Modules (Electronic), Least squares method, Time-interval counters, Ballistics, Programming languages.

The objective of this program is to detect and correct accidental errors in data from an input tape and then to prepare a new tape which incorporates these changes. Accidental errors are those values in the data which are due to the malfunction of the instrumentation and do not reflect actual changes in the phenomena being observed. Such errors may be caused by noise, static 'in flights', etc. The program is based upon and incorporates the essential features of the module for accidental errors as outlined in Internal Technical Notes 35 and 41. There are three versions of the program: AECO I is designed to handle raw data, i.e., data without header or trailer labels and not arranged into files. AECO II is designed to handle input tapes which consist of only one file, though with header and trailer records. AECO III is an advanced version of AECO II with multifile capability.

AD-609 330 Div. 30, 12
OTS Prices: HC $1.00/MF $0.50

Army Missile Command, Redstone Arsenal, Ala.
A MODULAR GENERAL PURPOSE PROGRAM FOR TIME SERIES DATA REDUCTION FOR POST REAL TIME REDUCTION OF CONSTANT TIME INTERVAL DATA.
Internal technical note no. 41,
by Roger A. MacGowan. 2 May 63, 14p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Series, Time), (*Programming (Computers), Series), (*Statistical data, Real time), Reduction, Time-interval counters, Programming languages, Compilers, Algebra, Ballistics, Modules (Electronic).

AD-609 331 Div. 30, 8
OTS Prices: HC $1.00/MF $0.50

Army Missile Command Computation Center, Army Missile Support Command, Redstone Arsenal, Ala.
SPECIFICATIONS FOR A GENERAL PURPOSE BCD UNPACK MODULE FOR SINGLE TIME STEP, REPETITIVE MODE, INTEGER DATA.
Internal technical note no. 42,
by Wilton L. Whigham. 27 May 63, 3p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Modules (Electronic), Specifications), Time, Data, Control sequences, Computer programs, Input-output devices, Magnetic tape, Binary arithmetic.

This module will unpack blocks of BCD data where each block contains a time sample and n data samples where n is less than or equal to 225. The maximum number of computer words per block of input will be less than or equal to 151. Under parameter control the module will process any number of files per tape, skip initial files, skip initial records within the file before processing, and process any number of sequential input tapes. Under parameter control the program will output a variable number of files and tapes. Parameters will specify the number of BCD characters in the time sample and the data samples, the number of data samples per block, the sign bit position, and whether a 1 bit is plus or minus. Output will be on tape with one BCD sample per computer word. All bit shifting required to unpack the data will be performed in FORTRAN.

AD-609 337 Div. 30, 25
OTS Prices: HC $3.00/MF $0.75

Coordinated Science Lab., Univ. of Illinois, Urbana.
PROGRESS REPORT FOR JUNE, JULY, AND AUGUST, 1964.
9 Nov 64, 101p
Contracts DA28 043AMC00073E, AF49 638 1383
Unclassified report

Descriptors: (*Scientific research, Reviews), Rockets,

Nuclear physics, Computers, Data processing systems, Bubble chambers, Compilers, Vacuum apparatus, Instrumentation, Plasma physics, Magnetic fields, Superconductors, Voltage, Films.

Contents: Aerospace group; Surface and atomic physics; Computer research applications; Systems; PLATO; Vacuum instrumentation; Plasma physics; High magnetic field superconductors; High voltage breakdown; Thin films; Computer operations.

AD-609 356 Div. 30, 23, 28
OTS Prices: HC $3.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
APPLICATIONS OF THE BEHAVIORAL SCIENCES TO RESEARCH MANAGEMENT: AN INITIAL STUDY IN THE OFFICE OF AEROSPACE RESEARCH,
by Howard M. Vollmer. Nov 64, 94p
Contract AF49 638 1028, Proj. 9778, IM3580, Task 37707
AFOSR 64 2555

Unclassified report

Descriptors: (*Research program administration, Personnel management), (*Personnel management, Research program administration), (*Management engineering, Air force research), Scientific research, Scientific personnel, Civilian personnel, Leadership, Management planning, Behavior, Attitudes.

Investigation was made of ways to apply findings of behavioral sciences research to interests regarding the management of in-house laboratories in the Office of Aerospace Research. The method of the study included collection of data by use of personal interviews, a standard written questionnaire, and review of management records, and also included inputs of information from the behavioral sciences to OAR management during the twelve-month period covered by the study. Findings on research organization substantiate the importance of protecting the integrity of research activities and to differentiate them from development, to maintain a participatory style of leadership, to support methods to translate research findings into rapid utilization, and to assure a sense of continuity in laboratory structure and research programs. Findings on the evaluation of research productivity point out methods to measure the quality of research products, as well as quantity, through examining subsequent citations of publications and the source of original publication. Findings on the recruitment, retention, and utilization of scientists suggest the importance of freedom in the conduct of research as a general incentive related to research productivity and job satisfaction and also indicate the importance of further research to analyze effectiveness of different incentives for different types of civilian and military scientists identified in this study. (Author)

AD-609 378 Div. 30, 12, 16, 27
OTS Prices: HC $12.30/MF $4.00

Aerospace Medical Div., Air Force Systems Command, Brooks AFB, Tex.
ANNUAL AIR FORCE SCIENCE AND ENGINEERING SYMPOSIUM (11TH), BROOKS AIR FORCE BASE, TEXAS, 20-22 OCTOBER 1964.
20 Oct 64, 928p

Unclassified report

Descriptors: (*Astronautics, Symposia), (*Symposia, Aeronautics), (*Air force research, Symposia), (*Space medicine, Symposia), (*Propulsion, Space propulsion), Spacecraft, Lunar probes, Trajectories, Solar cells, Electric propulsion, Human engineering, Weightlessness, Energy conversion, Electrolytic cells, Diodes (Semiconductors), Radiation damage, Radiation effects, Space biology, Aeronautics, Engineering, Ketones, Harmonic oscillators, Radio astronomy.

Contents: Lunar landing system; Trajectories; Coatings for solar powered thermoelectric devices; Electric propulsion; Human performance under low and zero gravity conditions; Electrofluiddynamic energy conversion; Spectra of anions: Acetylacetonates; Radio star and satellite scintillations; Electron radiation damage in ZnSe; Ionizing radiation in the rhesus primate; Enzymes in photochromic optical shutters for nuclear flash protection; Structural vibration with and without damping treatment; Range safety system; Thrust bearings; Controlling the attitude of a satellite using the earth's magnetic field; Infrared instrumentation.

AD-609 392 Div. 30
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
DESIGN OF A PRINTER SYNCHRONIZER FOR VERIFYING DATA CONVERSIONS,
by Frederick Holser. Nov 64, 27p
Proj. SR003 09 01, Task 0005
DTMB 1794

Unclassified report

Descriptors: (*Computers, Design), (*Data processing systems, Computers), Digital-to-analog converters, Analog-to-digital converters, Digital systems, Printing, Data, Synchronization (Electronics), Theory.

The report summarizes the design and development of a digital synchronizer and page printer that has been integrated into the Computer Data Format Translator system to provide a means of printing out and thus verifying the validity of data conversions performed by this system. (Author)

AD-609 421 Div. 30, 15, 26, 32
OTS Prices: HC $4.00/MF $1.00

Systems Research Center, Case Inst. of Tech., Cleveland, Ohio.
A THEORY OF SIMPLE CONCEPTS WITH APPLICATIONS,
by Thomas G. Windeknecht. 1964, 122p
SRC-53-A-64-19
Grants NSF GP6558, AF AFOSR125 63
AFOSR 64 2407

Unclassified report

Descriptors: Inventory control, Date processing systems), (*Data processing systems, Inventory control), (*Artificial intelligence, Mathematical logic), Digital computers, Mathematical models, Algebra, Theorems, Classification, Pattern recognition, Set theory, Control sequences, Information retrieval.

A theoretical study leading toward the solution of a class of inventory problems by digital computation is reported. Using a formal model of concepts in the activity of object recognition due to Banerji, a theory of simple concepts is constructed. The algebraic structure of the class of simple concepts is developed. A relationship between the formal notions of relevance and simplicity on the set of concepts is proved. The simple concepts are shown to be precisely that class that can be learned by a certain focusing strategy. Consideration of the characteristics of the set of simple concepts leads to a new technique for concept description, which is presented as a formalism. Progress on a concept learning machine based upon the proposed formalism for concept description is discussed. The machine will have a formidable capacity for self-organization, and appears to be applicable for solution of some of the inventory problems discussed. (Author)

AD-609 422 Div. 30
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
EXPERIMENTAL METHOD FOR TESTING MATERIALS IN BIAXIAL STRESS FIELDS,
by D. P. Fitzgibbon. 25 Feb 60, 50p
STL/TR-60-0000-09028
Contract AF04 647 309 Unclassified report
AFBMD TR60 45
Descriptors: (*Materials, Test methods), (*Metals, Stresses), (*Stresses, Measurement), (*Pressure vessels, Stresses), Straing (Mechanics), Failure (Mechanics), Test equipment, Pressure gages, Strain gages.

A simple method has been devised to investigate material characteristics under various biaxial stress conditions by using commercially available equipment and inexpensive specimens. The specimen employed is a cylindrical pressure vessel which can be subjected simultaneously to end load and pressure. Various ratios of axial-to-circumferential stress can be obtained while both stresses are being increased to specimen failure. Biaxial stress-strain relations are obtained from autographic recordings of axial and circumferential strains as a function of end load and pressure. Included are detailed descriptions of specimen configuation, test setup (instrumentation), pretest calibration procedures and equations, and data interpretation. (Author)

31. Ships and Marine Equipment

AD-609 068 Div. 31, 9
OTS Prices: HC $6.00/MF $1.25

Conesco, Inc., Cambridge, Mass.
SHIP HULL VIBRATIONS. 2. THE DISTRIBUTION OF EXCITING FORCES GENERATED BY PROPELLERS,
by F. E. Reed and R. T. Bradshaw. Jun 60, 213p
CONESCO-F-101-2
Contract NObs77150

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ship hulls, Vibration), (*Propellers (Marine), Vibration), (*Marine engineering, Vibration), (*Vibration, Propellers (Marine)), Engine structures, Ship structural components, Shafts, Loading (Mechanics), Force (Mechanics), Moments, Stresses, Hydrodynamics, Mechanics, Numerical analysis.

A study of the forces acting on a hull as a consequence of the propeller action. Develops calculation forms for computing the dynamic forces and moments generated by a propeller operating in a variable wake. Describes a program for computing the shaft-bearing reactions resulting from these propeller forces. Presents a method of computing hull pressure forces resulting from the propeller pressure field. The various procedures are illustrated by numerical examples. (Author)

AD-609 083 Div. 31, 9
OTS Prices: HC $3.00/MF $0.75

Webb Inst. of Naval Architecture, Glen Cove, N. Y.
EXPERIMENTAL DETERMINATION OF SHIP WAVE RESISTANCE FROM THE WAVE PATTERN.
Rept. for 1 Sep 63-31 May 64,
by Lawrence W. Ward. May 64, 78p
Contract Nonr415200, Proj. SR009 01 01

Unclassified report

Descriptors: (*Ship hulls, Hydrodynamics), (*Water waves, Ship hulls), Ship models, Model tests, Mechanical properties, Mathematical analysis, Theory, Cylindrical bodies.

Ship wave resistance is defined and a survey of past and present efforts to determine this from a survey of the model wave pattern during a model test is given. A new method is developed using the continuous record of the x and y components of the lateral force exerted on a long fixed vertical circular cylinder by the model wave system after passage of the model. The paper includes theoretical analysis, a description of the technique and equipment necessary, and results of experiments run at Webb Institute on a Series 60 Model and on the A. T. T. C. Standard Model. These findings are compared to the Michell thin ship theory and to other experimental results. The results indicate that the method is a practical means of determining wave resistance in an ordinary ship model tank. Conclusions are drawn in regard to possible areas of future investigation. (Author)

AD-609 324 Div. 31, 9
OTS Prices: HC $1.00/MF $0.50

Mass. Inst. of Tech., Cambridge.
THE EFFECT OF FORWARD SPEED ON DAMPING FOR A VARIETY OF SHIP TYPES AS CALCULATED BY THIN SHIP THEORY,
by Martin A. Abkowitz. Sep 64, 20p
MIT-DE-R64-13
Contract Nonr184164, Proj. SR009 01 01

Unclassified report

Descriptors: (*Ships, Velocity), (*Damping, Ship hulls), (*Ship hulls, Tests), Mathematical analysis, Programming (Computers), Hydrodynamics, Pitch (Motion), Cargo ships, Tankers, Destroyers, Ships (Nonmilitary), Naval vessels (Combatant), Model theory, Motion.

Since the damping coefficients play a predominant role in the motion response of ships in pitch and heave at resonant frequencies in a seaway, use was made of two computer programs recently developed at M. I. T. to calculate, by thin ship theory, the effect of ship speed on the damping coefficients in pitch and heave for four diverse types of ship hulls--cargo ship, tanker, destroyer, and trawler. Results indicate that, for all four hull types, there is a marked increase in pitch damping coefficient and a smaller increase in heave damping coefficients as the ship speed is reduced, when the ship is oscillating at resonant frequency. These results are not substantiated by recent oscillator tests on a ship model, wherein a much less dependency of damping on forward speed is measured. (Author)

32. Miscellaneous Arts and Sciences

AD-608 914 Div. 32, 14
OTS Prices: HC $3.00/MF $0.75

Materials Advisory Board, NAS-NRC, Washington, D. C.
DISSEMINATION OF INFORMATION ON MATERIALS: AN ANALYSIS OF A SURVEY OF MATERIALS INFORMATION USERS TO DETERMINE EFFECTIVENESS OF INFORMATION DISSEMINATION.
Final rept. for Dec 63-Dec 64,
by N. C. Fick and W. A. Lane. Dec 64, 54p
Contract SD118
MAB 66SM

Unclassified report

Descriptors: (*Data processing systems, Effectiveness), (*Materials, Information retrieval), Data, Distribution, Libraries, Analysis, Department of Defense, United States Government, Documentation.

The study is concerned primarily with what materials people think about dissemination of information, particularly with regard to materials information centers and collections supported by the Department of Defense. Reference is made to information activities of other agencies such as the National Aeronautics and Space Administration, the Atomic Energy Commission, and the Department of Commerce. The materials people in industry, government, research institutes, and the universities feel that the Department of Defense is, in general, doing all that it should in dissemination of information. However, the survey results indicate quite clearly that the centers and collections and their coverage, service, and accessibility should be publicized more effectively. Alnalyses show that university, administrative, and basic research people and those interested in research materials make comparatively little use of DOD centers in their quest for information. The Defense Metals Information Center is better known and much more used than any of the other ten DOD materials information centers and collections, and it is used most extensively by people in applications and design work. (Author)

AD-608 916 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
IPC, A CODED CHARACTER SET FOR INFORMATION PROCESSING,
by Edward Morenoff, John B. McLean, and Lawrence Odell. Oct 64, 18p
RADC TDR64 426

Unclassified report

Descriptors: (*Data processing systems, Programming (Computers)), (*Programming (Computers), Data processing systems), Data transmission systems, Computers.

Information Processing Code (IPC) in an information manipulation-oriented character set and associated binary code representation. The code is designed to simplify internal information processing operations within the computer and the character set to maximize the transfer of information between the system user and the system. IPC in an 8-bit code set constructed so that 4, 5, 6 and 7-bit subsets can easily be derived. The set is organized so that simple binary comparisons can distinguish between the numeric, alphabetic, special symbol and control character codes. Unassigned codes are reserved for local interpretation. (Author)

AD-609 084 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE LABOUR PARTY AND UNILATERALISM,
by H. A. De Weerd. Feb 62, 24p RM-2914-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Political science, Great Britain), (*Foreign policy, Great Britain), Disarmament, Nuclear weapons, Labor, Leadership, Government (Foreign), Defense systems.

The period 1960-1961 may have decided the British Labour Party's relationship to unilateralism. Until recently it seemed that the party was on the verge of either being captured by the Campaign for Nuclear Disarmament (CND) or torn apart by violent internal conflicts over nuclear weapons. By autumn of 1961, however, it was clear that the nuclear disarmers had lost their initial chance of transforming a private protest movement into a significant political force. With an intensive program of grass-roots education and party discipline, Labor leaders have reversed the trend toward unilateralism and have restored some semblance of unity and a sense of purpose to their party. (Author)

AD-609 094 Div. 32, 18
OTS Prices: HC $2.00/MF $0.50

Pittsburgh Univ., Pa.
LEVELS OF ACTIVITY,
by Martha Willis Anderson. Oct 64, 49p
Contract OCD OS63 48

Unclassified report

Descriptors: (*Civil defense personnel, Statistical data), (*Sociology, Civil defense personnel), Cold war, Attitudes, Population, Public opinion, United States, Geography, Urban areas, Social sciences.

An investigation was conducted into the extent and composition of support for the Civil Defense program from World War II to 1963. The report is one of a series of papers based on data from a University of Pittsburgh national study entitled The Cold War and Civil Defense Attitudes, conducted during the year 1963 with a sample of 1,434. The focus was a set of three questions about Civil Defense activity: 1) Had the respondent or any member of his family ever been active in Civil Defense. 2) When. and 3) What did they do. Responses to these questions were run against relevant personal data in order to attempt to determine the number and composition of the group which had been active. It became immediately apparent that 14.6 percent of our respondents, or 196 people, had been active in Civil Defense at any time, and further that the majority of these people had been active during the Second World War and had participated most often in terms of carrying out assigned roles. The group seen as active at the time of interview is analyzed singly, in terms of the personal data. (Author)

AD-609 095 Div. 32, 18
OTS Prices: HC $1.00/MF $0.50

Pittsburgh Univ., Pa.
COLD WAR AND CIVIL DEFENSE ATTITUDES: THE DESIRABILITY OF ALTERNATE MODES OF ORGANIZING A CIVIL DEFENSE EFFORT,
by Alan N. Coleman. Oct 64, 20p
Contract OCD OS63 48

Unclassified report

Descriptors: (*Cold war, Attitudes), (*Civil defense systems, Public opinion), (*Sociology, Civil defense systems), United States, Statistical data, Population, Urban areas, Rural areas, Social sciences.

A national sample of 1,434 respondents was asked to assess the desirability of each of five different ways of organizing a civil defense program: (1) one carried out mostly by volunteers; (2) a program under state and local governments; (3) a near-military organization, similar to the National Guard; (4) a program under one of the present armed services; (5) a new, separate service along the lines of the present armed forces. In assessing the nature of the social situation from which opinions on the above-mentioned alternatives were generated, it was found, on the one hand, that all of the programs were generally more desirable to respondents in the lower socioeconomic positions in the society (in terms of income, education and occupation) and that Catholic respondents found all of the alternatives more desirable than did Protestants, with the exception of the state-local program, where both groups found it equally favorable. On the other hand, differences in social factors were reflected in the findings that non-metropolitan areas of residence found the voluntary and state-local alternatives more desirable than did metropolitan areas; that the voluntary program was favored equally by Republicans and Democrats but the state-local was desired more by Republicans, all other alternatives being favored more by Democrats than Republicans. (Author)

AD-609 096 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
HIERARCHIAL INVENTORY DECISIONS.
Working paper,
by Karl Borch. Oct 64, 20p WMSI-WP-60
Contract Nonr 23375, Proj. 047-041
Unclassified report

Descriptors: (*Stock level control, Theory), (*Inventory control, Theory), (*Decision making, Stock level control), Probability, Learning, Game theory, Operations research, Economics, Management engineering, Mathematical models.

Economic theory has so far had little to say about inventory keeping as an economic activity. The purpose of this paper is to point out the need for a theory of this economic activity. A retailer is considered who each Friday has to order goods for resale next week without actually knowing how much he will be able to sell during that week. Usually this retailer will stand to lose if he is caught with an unsold inventory at the end of the week, or if he is unable to satisfy the demand from his customers. In this unpleasant situation our retailer will probably try to keep an inventory which is optimal in the sense that it in some way will minimize the sum of losses from both sources. If the unknown future sales obey a known probability law, it is natural to define an inventory as optimal if it minimizes the expected losses, or on an equivalent and less pessimistic vein, if it maximizes the expected profits of the retailer. The mathematical structure of models for analyzing such problems can be given many concrete interpretations, i. e., applied to a wide range of different practical problems. A better understanding of these problems may be useful in many economic situations. It may, for instance, help develop a more realistic theory for the economics of the distributive trades.

AD-609 126 Div. 32, 30
OTS Prices: HC $4.00/MF $1.00

Stanford Research Inst., Menlo Park, Calif.
DEVELOPMENT OF A MULTIPLE INSTANTANEOUS RESPONSE FILE: THE AN/GSQ-81 DOCUMENT DATA INDEXING SET.
Final rept.,
by E. L. Younker, D. C. Condon, C. H. Heckler, Jr., D. P. Masher, and J. M. Yarborough. Oct 64, 129p
Contract AF30 602 2772, Proj. 4594, Task 459402
RADC TDR63 414
Unclassified report

Descriptors: (*Data storage systems, Models (Simulations)), (*Computer storage devices, Design), (*Information retrieval, Computer storage devices), Input-output devices, Subject indexing, Indexes, Dictionaries, Data processing systems, Magnetic cores, Circuits, Typewriters, Electrical equipment, Electronic equipment, Multiple operation.

An experimental model of an electronic reference retrieval file in which all file entries are interrogated simultaneously was designed and constructed. The principal purpose of this work is to demonstrate the usefulness of a rapid-feedback, man-machine relationship in a data retrieval system. The model is designed to store the indexes to 5,000 documents. Each document is given an accession number and is described by up to eight English words (descriptors) selected from a 3,000 word dictionary. The delivered model contains a 1,000 word dictionary and the indexes to 1,100 documents. A search question, consisting of one to eight descriptors in their natural English form, is entered by means of an electric typewriter. The machine indicates immediately whether or not any file item satisfies the search question, and if so, how many file items respond. The machine then resolves multiple responses and types out the accession number and full set of descriptors of each responding document. This equipment can handle synonymous input descriptors and has the capability for automatically modifying the manually inserted search question according to certain logical rules.

AD-609 179 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
SET THEORETIC MODELS FOR CLASSIFICATION AND RETRIEVAL,
by Richard Jernigan and Alfred G. Dale. Nov 64,
25p LRC-64-WTM-5
Grant NSF GN308
Unclassified report

Descriptors: (*Documentation, Automatic), (*Information retrieval, Mathematical models), (*Set theory, Information retrieval), (*Algebraic topology, Information retrieval), Algebra, Topology, Mathematical logic, Storage, Theory, Classification, Subject indexing, Operators (Mathematical), Convex sets, Algebras.

The appropriateness of lattice models as analogues of classification and retrieval systems is analyzed. Models considered include simple distributive lattices, and implicative and subtractive lattices. A particular topological model is also considered. It is shown that any set of topological axioms will be reducible to a Boolean algebra when applied to finite spaces. (Author)

AD-609 180 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
A PROGRAMMING SYSTEM FOR AUTOMATIC CLASSIFICATION WITH APPLICATIONS IN LINGUISTIC AND INFORMATION RETRIEVAL RESEARCH,
by A. G. Dale, N. Dale, and E. D. Pendergraft.
Oct 64, 24p LRC-64-WTM-4
Grant NSF GN208
Unclassified report
Paper presented originally at the International Study

Conference on Classification Research, Elsinore, Denmark, Sep 64.

Descriptors: (*Information retrieval, Programming (Computers)), (*Classification, Automatic), (*Documentation, Automatic), Feasibility studies, Feedback, Algebra, Mathematical models, Programming languages, Data storage systems, Control sequences, Language, Subject indexing, Symposia, Set theory.

Two key problems, both of which must be solved as a part continuing progress toward full use of the computer are discussed: automatic classification techniques, and how to use them as a basis for self-organizing descriptive systems in syntactic and semantic research. Under the first, were three objectives: (1) An appropriate basis for retrieval operations in the machine environment; (2) Techniques that are computationally feasible on a significantly large scale; and (3) Immediate use in order to facilitate current research and experimentation with man-machine systems. Algorithms developed largely by R. M. Needham and based on the theory of clumps provided the techniques for computing the necessary classifications and associations. Moreover, experiments by Needham and others have demonstrated the usefulness of the classification technique as a basis for associative document retrieval. These considerations have prompted the development of a programming system that provides a flexible computational facility for research and experimentation with classification techniques.

AD-609 191 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A THEORY OF BUREAUCRACY,
by Anthony Downs. Nov 64, 14p P-3031
Unclassified report

Descriptors: (*Political science, Theory), (*Decision making, Political science), Personnel, Leadership, Economics, Social sciences, Performance (Human).

In this paper an attempt is made to describe a theory of bureaucratic decisionmaking aimed at achieving predictability. The theory is based upon the fundamental hypothesis that bureaucratic officials, like all other agents in society, are motivated by their own self interests at least part of the time. Therefore, this theory follows the tradition of economic thought from Adam Smith forward, and is consistent with recent contributions to political science made by such writers as Simmel, Truman, Schattschneider, Buchanan, Tullock, Riker, Simon, and March.

AD-609 202 Div. 32, 18
OTS Prices: HC $4.00/MF $0.75

Pittsburgh Univ., Pa.
SOME PUBLIC VIEWS ON CIVIL DEFENSE PROGRAMS,
by Jiri Nehnevajsa, Dorothy V. Brodie, Donna Krochmal, and Richard Pomeroy. Dec 64, 112p
Contract OCD OS63 48, Task 4812B
Unclassified report

Descriptors: (*Civil defense systems, Public opinion), (*Public opinion, Civil defense systems), Sociology, Shelters, Costs, Attitudes, Population, United States, Statistical data, Sampling, Abstracting.

These four reports are based on a survey of Civil Defense and Cold War Attitudes conducted in mid-1963. Interviews were conducted with a national probability sample of 1,434 Americans. Each report takes as a topic a key aspect of the sample's orientation to civil defense systems and cold war issues and analyzes it in terms of relevant social and personal characteristics. Interview schedules were administered in the summer of 1963 and dealt with the likelihood and desirability of various alternative shelter systems and cold war outcomes. In addition to the data collected on attitudes and opinions on the central issues respondents were asked a series of questions specifying pertinent elements of their social and personal attributes. These dealt with such topics as marital status, family income, education, age, etc., and a variety of other questions tapping these dimensions.

AD-609 224 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
OWNERSHIP AND THE PRODUCTION FUNCTION,
by Lloyd Shapley and Martin Shubik. Dec 64,
31p RM-4053-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Game theory, Economics), (*Economics, Mathematical models), (*Production control, Economics), Costs, Labor, Food, Money, Political science, Distribution (Economics), Management control systems, Population, Urban areas, Rural areas, Law, Equations.

The thesis is advanced that the phenomenon of ownership, in complex economic situations, is best described in terms of strategic control over goods or processes, and that the simple 'chattel' view of property is inadequate when individual's technological possibilities are interdependent. This idea is developed through a sequence of game-theoretic models based on the same technological facts but incorporating different institutional constraints. (Author)

AD-609 226 Div. 32, 2 24
OTS Prices: HC $1.00/MF $0.50

Aeronautical Chart and Information Center, St. Louis, Mo.
CATALOG OF PUBLICATIONS.
Edition no. 4.
Nov 64, 14p
Unclassified report

Exclusive of Charts, Flight Information Publications, and Related Specifications.

Descriptors: (*Bibliographies, Scientific research), (*Mapping, Bibliographies), Catalogs, Aeronautics, Maps, Geodesics, Satellites (Artificial), Photography, Coatings, Processing, Reports.

AD-609 249 Div. 32, 15
OTS Prices: HC $2.00/MF $0.50

California Univ., Los Angeles.
INFORMATION STRUCTURES IN ADAPTIVE PROGRAMMING.
Woring paper
by Koichi Miyasawa. Oct 64, 32p WMSI-WP-61
Contract Nonr233 75, Proj. NR047 041
Unclassified report

Descriptors: (*Distribution (Economics), Theory), (*Communication theory Economics), Optimization, Dynamic programming Mathematical analysis.

Let $x_{t+1} = g(x_t, a_t : r_t)$, $t = 0,1,\ldots, N$, where a_t and x_t

are, respectively, the actions and the state at time t and g is a known function with a random parameter r_t. Our concern is to maximize the expected value of the utility $u(x_{N+1})$ of the final state by choosing acts a_t $t = 0,1,...,N$ appropriately. Various information structures are considered. For example, the decision maker may know at each instant t, the values of the previous states $x_0, x_1, \ldots, x_{t-1}$, and/or the acts taken previously $a_0, a_1, \ldots, a_{t-1}$, etc. In this way the alternative information structures which may be available to the decision maker are classified into several classes. The value of a given information structure, i.e., the maximum expected utility achievable under it depends on the distribution structure of the random parameters r_t, t = 0,1,.., N. These distribution structures, too, are classified into several categories. It is shown how, in problems of adaptive programming, the value of each information structure depends on each of the distribution structures. (Author)

AD-609 252 Div. 32
OTS Prices: HC $1.00/MF $0.50

Martin Marietta Corp., Orlando, Fla.
TECHNICAL WRITING: A SELECTED BIBLIOGRAPHY,
by Lucille McClure. 3 Nov 64, 17p RB-87
Unclassified report

Descriptors: (*Reports, Bibliographies), (*Bibliographies, Reports), Scientific research, Social communication, Vocabulary, Language, Specifications, Instruction manuals Handbooks.

AD-609 254 Div. 32
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
THE COST OF CAPITAL: A RECONCILIATION OF SOME EXISTING THEORIES THROUGH GENERALIZATION.
Working paper,
by Arnold Reisman. Nov 64, 24p WMSI-WP-57
Contract Nonr23373 Proj. NR047 003
Unclassified report

Descriptors: (*Economics, Theory), (*Commerce, Costs), (*Costs, Mathematical models), Management engineering, Budgets, Equations.

Several theories have been proposed in the past to evaluate the cost of capital and to show various combinations of financing modes on the overall financial structure of a company. These theories have been, in the past, considered inconsistent with one another, and at times even to be contradictory. This paper presents a generalization in this area which for purposes of conciseness, ease of manipulation, ease of application, etc. is expressed mathematically. This generalization is then used in a deductive fashion to show the similarities and the differences of existing theories and to delineate all other possible special cases of the model presented. Furthermore, by substituting the generalized formulation for the cost of capital this paper updates a Keynesean proposition, pertaining to the cut-off point in capital investment. (Author)

AD-609 258 Div. 32
OTS Prices: HC $1.00/MF $0.50

Army Materials Research Agency, Watertown, Mass.
THE NONDESTRUCTIVE TESTING INFORMATION SYSTEM,
by Peter W. Johnson and Charles P. Merhib.
Mar 64, 19p
AMRA MS64 02
Unclassified report

Descriptors: (*Information retrieval, Non-destructive testing), (*Non-destructive testing, Information retrieval), Documentation, Industrial research, Data processing systems, Computer personnel, Data processing systems, Automation, Sources.

This paper has been written to satisfy a number of needs: first, as a means of informing potential users of the existence of the information retrieval facility and its capabilities; second, to describe the system and its history for the benefit of operating personnel as well as users; and third, to indicate to these users the means by which they may obtain information. It would be ideal if there existed a central information retrieval center, all-encompassing yet minute in detail, available to all comers. The agency most closely approaching this ideal is the Defense Documentation Center which limits itself to Government reports. Since the ideal center does not exist, preliminary literature surveys on scientific work are not always complete or accurate and in some cases are nearly unobtainable. The result of this in many cases is duplication of effort, a waste of time, money, and manpower. The importance of availability of information has been emphasized in a report of The President's Science Advisory Committee, wherein the effectiveness of scientific and technical effort and efficiency of Government management of research and development lies in our ability to communicate information about current research efforts and the results of past efforts. Considering the growing importance of Nondestructive Testing and the lack of an adequate central file of information, it was merely a matter of time until an information retrieval system in the nondestructive testing field came into being.

AD-609 268 Div. 32, 18, 30
OTS Prices: HC $2.00/MF $0.50

Army Missile Command, Redstone Arsenal, Ala.
AUTOMATED COST ESTIMATES: ACE.
12 Jun 63, 41p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Costs, Mathematical prediction), (*Research program administration, Management planning), (*Military engineering, Management planning), (*Engineering, Management planning), Manpower studies, Automation, Computers, Wages, Labor.

ACE (automated cost estimates) is a means of forecasting research and development and engineering services cost and direct manhours. It is a computer application employing mathematical methods of calculating various cost and DMH (direct manhour expenditure for each expression of time) relationships and behavior trends, automatically selecting the network that will produce the best calculated forecast based upon historical data.

AD-609 306 Div. 32, 15
OTS Prices: HC $3.00/MF $0.75

Institute for Mathematical Studies in the Social Sciences, Stanford Univ., Calif.
THE THEORY OF GROWTH. A WALRASIAN GROWTH MODEL.

Technical rept. no. 129,
by Michio Morishima. 30 Nov 64, 64p
Contract Nonr22550, Proj. NR047 004

Unclassified report

Descriptors: (*Economic conditions, Mathematical models), Economic conditions), Mathematical analysis, Functional analysis, Economics, Wages, Production, Money, Stability, Set theory, Inequalities, Convex sets, Series, Game theory, Linear programming, Industrial production, Consumption.

The Walrasian model of economic growth is examined. Initially a two-sectoral mathematical model is assumed. It is further assumed that: the economy consists of many firms classified into two industries; there is no possibility of joint production; and a finite number of discrete manufacturing processes are available to each industry. It is shown that there is a short-run growth rate equilibrium corresponding to any given positive amounts of capital and labor. The proposition that a series of short-run equilibria, starting from an arbitrarily given capital-labor endowment, will eventually approach the state of the long-run equilibrium. In the long-run equilibrium prices remain unchanged and the stock of capital, the labor-force, and the outputs of the two industries grow forever at a constant, common rate. The theory is then generalized to include a multi-sectoral model.

AD-609 307 Div. 32, 15
OTS Prices: HC $3.00/MF $0.75

Institute for Mathematical Studies in the Social Sciences, Stanford Univ., Calif.
THEORY OF GROWTH: THE VON NEUMANN REVOLUTION.
Technical rept. no. 130,
by Michio Morishima. 4 Dec 64, 96p
Contract Nonr22550, Proj. NR047 004

Unclassified report

See also AD-609 306.

Descriptors: (*Economic conditions, Mathematical models), (*Mathematical models, Economic conditions), Economics, Population, Wages, Production, Money, Inequalities, Set theory, Matrix algebra, Series, Convex sets, Industrial production, Consumption, Game theory, Linear programming.

Economic growth is examined using the Von Neumann model which permits joint production and treats fixed capital goods of different vintages as different goods. The existence of a balanced growth of all outputs with continued full employment of labor is established. The path of this equilibrium growth rate is shown to have optimality properties. The effect of the real wage rate upon the growth rate of the working population is examined.

AD-609 370 Div. 32, 28
OTS Prices: HC $1.00/MF $0.50

Wisconsin Univ., Madison.
STUDY OF THE INFLUENCE OF CERTAIN CULTURAL AND CONTENT VARIABLES ON THE EFFECTIVENESS OF PERSUASIVE COMMUNICATIONS IN THE INTERNATIONAL FIELD.
Quarterly status rept.,
by S. Watson Dunn. 1 Jan 65, 5p
Contract Nonr120224, Proj. NR177 287

Unclassified report

Descriptors: (*Social communication, Culture), (*Culture, Social communication), (*Social psychology, Social communication), Language, Group dynamics, Public opinion, Attitudes, Sociology, Commerce.

The first experiment was designed to test the following predictive hypotheses: (1) A persuasive message is more effective when the source is seen as a member of the recipient's reference group than when the source is not a member. (2) A message translated idiomatically from another language is less effective than a message composed in the language in which it is read. (3) The effect of a source is more marked when a message is directly attributed to that source rather than simply appearing with it. (4) The effect of a persuasive communication is greater when a favorable source is shown with the message, regardless of whether the message is attributed to that source or not. (5) The effect of the group membership of the source is greater for ethnocentric individuals than for those low in ethnocentrism. (6) The effects of level of translation are more marked with highly ethnocentric individuals than with those low in ethnocentrism. (7) The more a foreign country is seen as like one's own, the more effective the persuasive communication from that country is, other things being equal. (8) The more favorably a foreign country is evaluated, the more effective its communication is, other things being equal. (9) Interest in and use of the mass media vary directly with the degree of social modernism in the user's attitudes.

33. Transportation

AD-608 947 Div. 33
OTS Prices: HC $4.00/MF $1.00

Federal Aviation Agency, Washington, D. C.
NORTH ATLANTIC REGION AIR TRAFFIC SURVEY, FY 1962.
Final rept.,
by Richard M. Warfield. Mar 63, 136p
Proj. 150 2S
N63 14613

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Air traffic, Atlantic Ocean), (*Atlantic Ocean, Air traffic), (*Transportation, Air traffic), Aircraft, Flight paths, Density, Distribution, Tables, Civil aviation, Armed forces transportation, Air transportation, Traffic, Reviews.

This report summarizes the traffic data collected in the North Atlantic Region Traffic Survey during FY 1962. Monthly peak day flight plan data was collected from 12 participating Oceanic Area Control Centers by the Federal Aviation Agency. An estimated total of 110,000 unduplicated flights (i. e., flights counted only once regardless of the number of OACC's involved) flew somewhere within the North Atlantic Region during FY 1962. The peak day for the survey was September 10, 1961, when there were 291 civil and 209 military flights combining for a total of 500 flights. Approximately two-thirds of all surveyed flights were by civil aircraft. Military flights above 45,000 feet and those flying in airspace altitude reservations were not included in the survey. The most frequently used altitudes at mid-Atlantic (30 degrees W meridian) were the 33,000 and 35,000 foot flight levels. Instantaneous airborne aircraft counts (IAC) were calculated at the beginning of each hour during the monthly peak days. A peak IAC of 94 aircraft occurred at 0500Z, on September 10, 1961. (Author)

AD-609 019 Div. 33, 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE HIGHWAYS OF THE FIVE OCEANS: THE FUTURE DEVELOPMENT OF AEROSPACE ROCKET PLANES,
by N. Aleksandrov. 5 Aug 64, 4p
FTD TT64 593; TT 65 60420

Unclassified report

Unedited rough draft trans. from Ekonomicheskaya Gazeta (USSR) 1964, no. 14 139 p. 39.

Descriptors: (*Air transportation, Rocket planes), Jet transport planes, Cargo, USSR, Aerospace craft.

How To Use New Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown below.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown on the next page.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 500
LINCOLN LAB MASS INST OF TECH
LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
LL 1964 63
(ESD TDR64 566)
AD-608 288 DIV. 8

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The AD-Division Index is arranged numerically by AD number and lists the subject division where the full entry can be located in TAB.

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AD-609 134 DIV. 30

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ACOUSTIC AND VIBRATION DATA PROCESSING AND ANALYSIS SYSTEM TITAN SILO-LAUNCH PROGRAM.
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ANNUAL AIR FORCE SCIENCE AND ENGINEERING SYMPOSIUM (11TH), BROOKS AIR FORCE BASE, TEXAS, 20-22 OCTOBER 1964.
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PRODUCTION FACILITIES FOR MULTI-TURN METALFILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-127 DATED 9 FEBRUARY, 1962.
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index.

1. Aircraft and Flight Equipment

AD-280 693 Div. 1, 12, 26
OTS Prices: HC $3.00/MF $0.75

Almay Research and Testing Corp., Los Angeles, Calif.
STUDY AND INVESTIGATION OF BLIND FASTENERS USED IN CONSTRUCTION OF MILITARY AIRCRAFT; PHASE I,
by Stanley N. Kennedy. 31 Dec 57, 72p
ALMAY-G8004
Contract NOas57 817c

Unclassified report

Descriptors: (*Airframes, Mechanical fasteners), (*Bolts, Airframes), (*Rivets, Airframes), Aircraft, Guided missiles, Construction, Specifications, Standards, Materials, Finishes and finishing, Installation, Physical properties, Mechanical properties, Machining, Performance (Engineering), Metallurgy.

Results are presented of a study concerning optimum requirements, physical and mechanical properties, configurations, varieties and potential for blind fasteners intended for use in Naval aircraft and missiles. Material was gathered by means of surveys of fastener manufacturers and users, literature surveys, and from production and laboratory experience in metallurgical inspection, testing, fabrication, and structural design requirements. The report specifically covers blind rivets and blind bolts.

AD-290 467L Div. 1
OTS Prices: HC $2.00/None

Aviation Safety Engineering and Research, Phoenix, Ariz.
STRENGTH ANALYSIS OF CARRIAGE ATTACHMENT FITTING ON CREW SEATS, HU-1 AIRCRAFT, AND RECOMMENDATIONS FOR IMPROVEMENT.
Crash Injury Bulletin,
by J. P. Avery. Oct 62, 34p AvCIR-62-11
Contract DA44 177TC802, Task 9R95 20 001 01
TRECOM TR62 84

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Helicopters, Aircraft seats), (*Aviation accidents, Aircraft seats), (*Aircraft seats, Fittings), (*Fittings, Stresses), Loading (Mechanics), Failure (Mechanics), Tensile properties, Aviation safety, Design, Survival.

The crew seat of the HU-1A aircraft has failed frequently in survivable type accidents, with the primary failure occurring in the carriage attachment fitting (Part Number 204-070-742-1). The most recent accident occurred at Fort Carson, Colorado, 7 May 1962. Analysis discloses that occupant inertia load of the order of 11G could have caused these failures. A simple field modification is presented which would reduce stresses in the fitting by a factor of approximately two. No new parts need to be manufactured; two AN bolts and one NAS spacer are the only new parts required. On the basis of accident evidence and a detailed stress analysis of the existing attachment fitting, it is concluded that the fitting is excessively stressed due to the moment fixity of its connection to the carriage channel. Consequently, it presents a weak link in the tiedown chain (seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure, seat anchorages, and floor). (Author)

AD-292 268 Div. 1, 26
OTS Prices: HC $4.00/None

Bendix Corp., Southfield, Mich.
STUDY OF ELECTRICALLY PRODUCED STRAIN FOR CONTROL PURPOSES.
Final rept.,
by C. S. Chang, R. K. Abbott, A. Blatter, I.W. Ginsberg, and W.A. Smith. Oct 62, 142p
Contract AF33 616 8138, Proj. 8225, Task 822504
ASD TDR62 621

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Flight control systems, Magnetostrictive elements), (*Hydraulic valves, Control systems), Magnelostriction, Electrostriction, Piezoelectric effect, Servomechanisms, Design, Integral equations, Thermodynamics, Aircraft, Cobalt alloys, Iron alloys, Palladium alloys, Torque, Strain (Mechanics), Deformation.

Feasibility studies were made on the use of electrically produced strain (magnetostriction, electrostriction, and piezoelectric effects) in flight control systems. The specific application used for feasibility demonstration of the principle is to control the first stage of a two-stage, electrohydraulic servo valve being used in a current military flight control system. The study included suitable electricalstrain-producing materials, the design and fabrication of a control element using electrical strains, and the test and evaluation of this control element as part of a control component in a servo actuating loop. (Author)

AD-419 210 Div. 1
OTS Prices: HC $4.00

Aviation Crash Injury Research, Phoenix, Ariz.
UNITED STATES ARMY AVIATION CRASH INJURY RESEARCH.
Final rept. for 16 Sep 61-15 Dec 62.
15 Dec 62, 106p AvCIR62-29
Contract DA44 177tc802, Task 1A024701A12101
TRECOM TR63 23

Unclassified report

Descriptors: (*Aviation accidents, Army aircraft), (*Aviation safety, Army research), Aircraft fire control systems, Aircraft seats, Safety harness, Armed forces transportation, Locking fastener devices, Aviation personnel, Protective clothing, Helmets, Helicopters, Commercial planes, Test methods, Remote control systems, Military requirements, Design, Statistical analysis.

Division 1s

Research was done on full-scale remote control crash testing of aircraft and to the development and testing of crash and postcrash fire inerting and suppression systems. Intensive activities were carried on in statistical analysis. Work continued in the training of crash injury investigators and in the field investigation of Army aircraft accidents.

Patent 3,144,999 Div. 1, 9

PROPELLER BLADE LOADING CONTROL.
NASA-assigned Patent,
by Vernon L. Rogallo. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Boundary layer control systems), (*Boundary layer control systems, Propeller blades), (*Propeller blades, Boundary layer control systems), Flight control systems, Aerodynamic characteristics, Aeronautics.

The propeller blade loading control produces an unsymmetrical fluid stream around the propeller disc to relieve or eliminate all propeller forces and moments except thrust and torque, resulting in the ability to use smaller aircraft control surfaces, relieve vibratory stresses and provide for more uniform flow over afterbodies or wings to reduce drag. (Author)

Patent 3,149,456 Div. 1

DAMPED THRUST.
Army-assigned Patent,
by Charles S. Sterrett. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive actuators), (*Explosive actuators, Patents), (*Jettisonable equipment, Patents), Damping, Propelling charges, Gases, Aircraft equipment.

The thruster is utilized in emergency aircraft escape systems. The gas from a propellant charge is used to effect the power stroke of the thruster and to provide the integral damping action. This involves the use of a combined high-low principle with dual driving faces and a single buffer face.

Patent 3,149,457 Div. 1

GAS PRESSURE OPERATED THRUSTER.
Army-assigned Patent,
by Stanley J. Kent. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive actuators), (*Explosive actuators, Aircraft), Explosive gases, Pistons.

The thruster is of the type wherein a piston, coupled to a load device, is moved in a cylinder by gas pressure resulting from the firing of an explosive cartridge. The device has aircraft applications. The cartridge is firmly seated at the time it is fired. Thereafter the cartridge case is utilized to unlock the piston from the cylinder.

Patent 3,149,491 Div. 1, 2

AIRBORNE JET STREAM DETECTOR.
Air Force-assigned Patent,
by Norman Sissenwire, Robert Leviton, and Charles F. Campen, Jr. 22 Sep 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Wind-direction indicators), (*Jet streams (Meteorology), Wind-direction indicators), (*Wind-direction indicators, Aircraft equipment), Pilot tubes, Airborne.

The flight instrument is utilized to determine the direction of a jet stream axis. The jet stream is used to add to the ground speed of the aircraft. A pair of Pitot-static tubes is used, one on the outer tips of each of the wings. The relative air speed of the two tubes is measured and compared to determine the point which encounters the higher air speed, indicating the direction of the stream.

Patent 3,149,806 Div. 1, 12

SIDE ARM CONTROLLER.
Navy-assigned Patent,
by Marvin F. De Boy. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight control systems), (*Flight control systems, Manned spacecraft), (*Spacecraft, Flight control systems), (*Aircraft, Flight control systems), Aircraft equipment, Roll, Yaw, Pitch (Motion).

The control device is utilized in space vehicles and high performance aircraft for control of roll, pitch and yaw. The device is operable by the hand of a pilot and includes a hand actuator and two pickoff elements.

Patent 3,150,847 Div. 1, 27

JET VEST.
Army-assigned Patent,
by Thomas M. Moore and Herman F. Beduerftig.
29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flying platforms), (*Flying platforms, Jets), (*Air transportation, Flying platforms), Thrust, Rocket motors, Control systems, Armed forces transportation, Portable, Flight clothing.

The anti-gravitational device is in the form of a jet vest which is attached to the user of the device. Thrust is developed by use of a rocket motor. Propulsion is controllable.

Patent 3,153,395 Div. 1

PARACHUTE RELEASE MECHANISM.
Navy-assigned Patent,
by Raymond E. Karp. 20 Oct 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Parachutes, Release mechanisms), (*Patents, Release mechanisms), (*Release mechanisms, Parachutes), (*Parachute descents, Torpedoes), Aircraft, Sea water, Impact shock.

The release mechanism is associated with a parachute used for lowering a torpedo or depth charge into the water after release from an aircraft. The parachute is jettisoned when the torpedo impacts the sea water.

The mechanism is used with apparatus disclosed in patent No. 3,066,632. The release apparatus prevents premature release of the parachute from the torpedo by rejecting spurious radiation and other signals.

Patent 3,153,428 Div. 1, 26

HIGH-TEMPERATURE GAS-LIQUID ACCUMULATOR.
Navy-assigned Patent,
by Donald Z. Erie and Ralph L. Vick. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hydraulic accumulators), (*Hydraulic accumulators, Airborne), Aircraft equipment, Gases, Liquids, Separation, Pistons, Hydraulic seals, Springs.

An accumulator is provided in which complete isolation of a liquid from a gas is achieved even though the accumulator is subjected to the temperature extremes which might be encountered, for example, when the device is installed on an aircraft capable of traveling at supersonic speeds and designed for high-altitude flight. The basic feature of the concept resides in the provision of seals on both the liquid and gaseous ends of the piston assembly, each of these seals being spring-loaded to provide satisfactory sealing action throughout the above-mentioned temperature range while at the same time requiring a minimum of contact load.

Patent Design 199,105 Div. 1

AIRCRAFT.
NASA-assigned patent design,
by William C. Sleeman, Jr. 8 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Supersonic planes), (*Supersonic planes, Design), Aerodynamic configurations, Supersonic flight, Aircraft.

The aircraft has a long pointed fuselage. The wing surfaces are attached from the mid-point of the fuselage to the end of the fuselage and sweep rearwardly. The engines appear to be positioned underneath the rear of the fuselage. The ends of the wings carry control surfaces.

PB-166 284 Div. 1, 25
OTS Prices: HC $9.10/MF $2.50

General Electric Co., Cincinnati, Ohio.
RESEARCH INVESTIGATION OF THE GENERATION AND SUPPRESSION OF JET NOISE,
by R. Lee, R. Kendall, E. B. Smith, W. Semrau, and R. J. Wells. 16 Jan 61, 608p
Contract NOas59 6160c
AD 251 881
Unclassified report

Descriptors: (*Jet engine noise, Reduction), Inhibition, Nozzles, Jet mixing flow, Sound transmission, Shock waves, Programming (Computers), Optimization.

Analytical and experimental investigations on jet noise suppression led to establishment of a new theory relating the sound power spectra and distribution of mean flows in the jet field. The method is sufficiently general to be applicable to flow fields of nozzle-suppressors; and is found to be in agreement with test results. A computer program was also set up for calculating the mean flow characteristics of mixer-type suppressors in general. Scale model testing on various suppressor configurations indicated that further noise reduction may be achieved using suggested optimization techniques. Directivity investigation on jet noise further confirms the fact that directivity of suppressors can be predicted with reasonable accuracy based on sound power spectrum data alone. Screech phenomena were investigated, including flow interference and temperature effects, leading to formulation of a detailed physical model for their generation. (Author)

PB-166 289 Div. 1, 2
OTS Prices: HC $8.75/MF $2.50

General Dynamics/Convair, San Diego, Calif.
ENGINEERING SUMMARY OF AIRFRAME ICING TECHNICAL DATA,
by D. T. Bowden, A. E. Gensemer, and C. A. Skeen.
Dec 63, 574p
Contract FA WA4250, Proj. 343 12H 1
FAA ADS4
Unclassified report

Descriptors: (*Ice prevention, Airframes), (*De-icing systems, Airframes), (*All-weather aviation, Ice prevention), Flight paths, Mission profiles, Ice, Meteorological parameters, Aircraft equipment, Ice formation indicators, Civil aviation, Air force equipment, Mechanical drawings, Specifications, Engineering, Reviews.

This report provides, in a single reference document, an engineering summary of selected technical data on airframe icing conditions, methods of detecting, preventing, and removing ice from airframes in flight, and methods of testing ice protection systems to ensure their adequacy. An aircraft engineer can use this report to design adequate ice protection systems for any type aircraft for any flight mission profile. The work done in preparing this report covered a survey, study, analysis, and summary of the vast amount of technical literature on airframe icing available in the world today. Key technical data on airframe icing was selected and summarized for the report. Results of the work provide a design engineer with the following: a. Complete statistical data on the earth's icing weather conditions that can be used as design criteria for airframe ice protection systems. b. An explanation of the physics of airframe ice collection. c. A discussion of known methods of airframe ice protection, and formulas and data to be used in their design. d. Selected specific applications of ice protection systems to conventional aircraft airframes. e. Data on known methods and systems for detection of airframe icing. f. Various methods of testing ice protection systems and aircraft for adequacy. (Author)

2. Astronomy, Geophysics and Geography

AD-402 764 Div. 2, 20
OTS Prices: HC $4.00/None

Geotechnical Corp., Garland, Tex.
LONG RANGE SEISMIC MEASUREMENTS: HAYMAKER.
Final rept.,
27 Jun 62, 144p Geotech-TR-63-4
Proj. 8 4
Unclassified report

Rept. on Proj. VELA-UNIFORM.

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-293 469, AD-293 482.

Descriptors: (*Nuclear explosions, Seismic waves), (*Underground explosions, Seismic waves), Seismographs, Measurement, Recording systems.

HAYMAKER is the code anme for the nuclear device exploded underground at the Nevada Test Site at 18:00:00. 12Z, 27 June 1962. The pertinent information regarding the explosion is summarized. Seismic waves generated by HAYMAKER were recorded at 34 of the 36 Long Range Seismic Measurements (LRSM) stations and at the Wichita Mountains Seismological Observatory (WMO). Seismic waves generated by the crater collapse were recorded at 29 of 36 stations and at WMO. The geographic distribution and the type or types of data recorded by each station for the explosion and the cavity collapse are shown. The site information is given. This report is devoted to the presentation and interpretation of the results of visual and machine analysis of the seismic information recorded at the LRSM stations and at WMO. (Author)

AD-411 398 Div. 2, 12
OTS Prices: HC $5.00/None

Allied Research Associates, Inc., Concord, Mass.
METEOROLOGICAL SATELLITE SYSTEM ANALYSIS.
Final rept.,
by Thomas S. Huang, Earl S. Merritt, and Arnold H. Glaser. 30 Jun 62, 200p
Contract AF19 604 5582, Proj. 6698; ARPA Order 26 59, Task 66981 2 3
AFCRL 63 804; N63 19138
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Meteorological satellites, Weather forecasting), Jet streams (Meteorology), Tropical cyclones, Hurricane tracking, Cloud cover, Photographic analysis, Theory.

This report contains three articles relating to the design and use of a weather satellite system. In 'Can TIROS See Jet Streams,' the possibility is examined of jet stream location through interpretation of cirriform banded patterns. 'TIROS-Revealed African Disturbances Related to Atlantic Hurricanes' traces the apparent origin of some Atlantic hurricanes to certain circulations over Central Africa, north of the Equator. They seem to be analogous to the line squall, but exhibit a vortical pattern, at least in the middle atmosphere. A possible origin for these distrubances is the lee trough of the Ethiopian Plateau in the southern Sudan. When they pass out over the Atlantic in the Cape Verde Islands region, favorable conditions may result in rapid deepening to hurricane intensity. 'Some information-Theoretic Considerations and Measurements Concerning the Efficient Processing of Satellite Cloud Pictures' addresses itself to the problem of efficiently reducing the information bit content of weather satellite pictures to an amount that can be economically transmitted to operational users and there assimilated.

AD-423 422 Div. 2, 22
OTS Prices: HC $5.00/None

Sandia Corp., Albuquerque, N. Mex.
CLOSE-IN PHENOMENA OF BURIED EXPLOSIONS.
Final rept.,
by A. J. Chabai. 1 May 63, 161p SC-4907(RR)
Contract DASA E0300 61, Proj. 14 041 00, ARPA Order 172 61
DASA 1382 Unclassified report

Descriptors: (*Underground explosions, Seismology), (*Seismology, Underground explosions), Shock waves, Seismic waves, Propagation, Geology, Fluid mechanics, Explosion effects, Nuclear explosions, Chemicals, Explosions, Instrumentation, Geophysics.

Delineation of the characteristics of the close-in disturbance provides insight into the manner of seismic wave generation by explosions, a central aim of the Vela-Uniform Program. The close-in region about a buried explosion may be described as that in which wave propagation is nonelastic. Specific aims of this research have been the development of instruments capable of making measurements in the nonelastic region about buried explosions, investigation of medium properties of geologic solids relevant to studies of the close-in region, and development of a theory for description of spherical wave propagation from buried explosions.

AD-432 073 Div. 2
OTS Prices: HC $2.00/None

Air Force Cambridge Research Labs., Bedford, Mass.
AIR FORCE INTERIM SUPPLEMENTAL ATMOSPHERES TO 90 KILOMETERS.
Air Force Surveys in Geophysics,
by Allen E. Cole and Arthur J. Kantor. Dec 63, 46p
AFCRL 63 936; AFSG 153
Unclassified report

Descriptors: (*Atmosphere, Northern Hemisphere), Humidity, Barometric pressure, Density, Atmospheric temperature, Tables, Meteorology, Climatology, Geophysics.

A mean annual Tropical (15 degrees N) Atmosphere and January and July Subtropical (30 degrees N), Midlatitude (45 degrees N), Subarctic (60 degrees N), and Arctic (75 degrees N) Atmospheres have been prepared as supplements to the 1962 U. S. Standard Atmosphere; they provide information on latitudinal and seasonal changes in atmospheric structure up to 90 km. In addition to mean January and July atmospheres, cold and warm atmospheres, reflecting the two winter thermal regimes that have been observed in the arctic and subarctic stratosphere, are presented. Vertical temperature gradients for various altitude segments of each atmosphere are linear with geopotential height. Humidity is incorporated into the pressure and density computations for the lowermost 10 km of each atmosphere. Figures and tables depict temperature, relative humidity, pressure, and density. The atmospheres presented in this report were adopted by the Committee on the Extension to the U. S. Standard Atmosphere (COESA) on 9 July 1963 for publication as a supplement to the U. S. Standard Atmosphere, 1962. They modify and expand data previously published in AFCRL Research Note 62-899, September 1962. (Author)

Patent 3,153,727 Div. 2

AUTOMATIC RAINDROP SIZE SPECTROMETER AND RECORDER.
Army-assigned Patent,
by Alan M. Nathan. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Meteorological instruments), (*Spectrum analyzers, Raindrops), (*Recording systems, Raindrops), Particle size, Computer storage devices, Automatic, Circuits.

The raindrop sizer and counter is placed outdoors to collect information on all the raindrops that fall through an area about 5 inches square. Information relating to the number of various sized raindrops is sorted out by electronic circuits and stored in a memory

or counter unit which can be placed in a shelter some distance away. This memory unit stores the data for as long as a minute then records it on tape. Later the tape record of several hours of rainfall can be fed directly into a computer for analysis.

Patent 3,153,772 Div. 2

FORCE TRANSDUCER,
Army-assigned Patent,
by John A. Dorr. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Transducers), (*Seismic waves, Measuring devices (Electrical and electronic)), Circuits, Strain (Mechanics), Force (Mechanics), Seismology.

The device is for detecting and measuring the intensity of seismic disturbances. It is expendable. A Wheatstone bridge circuit is employed. The resilient measuring device, when impinged upon by a seismic stress disturbance, creates a measurable strain, the extent of which is proportional to the foree producing it.

PB-166 444 Div. 2
OTS Prices: HC $1.00/MF $0.50

Weather Bureau, Washington, D. C.
RESISTANCE-TYPE PRECIPITATION DETECTOR.
Meteorological engineering rept.,
by Charles B. Haegele. Sep 64, 18p MER-1'
Unclassified report

Descriptors: (*Meteorological instruments, Atmospheric precipitation), (*Atmospheric precipitation, Meteorological instruments), Models (Simulations), Design, Resistance (Electrical), Measurement, Freezing, Liquids, Monitors.

This paper describes two models of precipitation detectors that utilize the resistance measuring principle and proposes a third type. The first model detects liquid precipitation only. The second model has heaters and will detect precipitation at subfreezing temperatures. The third is a proposed model of new design with features additional to those of the first two models. The features include the option of either utilizing existing precipitation equipment or using a new housing. (Author)

PB-166 445 Div. 2
OTS Prices: HC $1.00/MF $0.50

Weather Bureau, Washington, D. C.
AN OZONE RADIOSONDE FOR OPTIMUM SENSOR EXPOSURE.
Meteorological engineering rept.,
by William Morrison. Oct 64, 14p MER-12
Unclassified report

Descriptors: (*Radiosondes, Ozone), (*Ozone, Radiosondes), Meteorological instruments, Telemeter systems, Data transmission systems.

This article describes a recoverable package with components arranged so that ozone and conventional radiosonde data are telemetered by a production Weather Bureau Radiosonde. The radiosonde is modified to accept a self-calibrating ozone sensor and its transducer with a motor switch between sensors. The instrument is versatile as more sensors can be added. (Author)

PB-166 496 Div. 2
OTS Prices: HC $3.00/MF $0.75

Rutgers Univ., New Brunswick, N. J.
A STUDY OF PEDOLOGIC PROCESSES IN ANTARCTICA.
Final rept.,
by F. C. Ugolini. 1964, 82p
Grants NSF G17212, NSF G23787
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Soils, Polar regions), (*Polar regions, Soils), Chemical properties, Physical properties, Soil mechanics, Geological survey, Glaciers, Microbiology, Algae, Lichens, Guaniclines, Geochemistry.

Soil distribution and soil formation in the ice-free areas of Southern Victoria Land and Dominion Range have been investigated. As a result of this study, the major soils of Antarctica have been referred to as soils of the cold desert and further classified into: ahumic soils, evaporite soils, protoranker soils, ornithogenic soils, regosols and lithosols. The lithosols and the ahumic soils are the most widespread soils. Soil formation in Antarctica occurs under extremely low temperatures with paucity of water and under virtually abiotic conditions with the exception of microflora and fauna. Only in restricted areas soils are covered by a layer of organic matter. These conditions are found where milder and wetter conditions exist. Here mosses and algae are found. Soils in the rookeries where guano material accumulates on the mineral soil are another exception. A detailed study in the Lower Wright Valley on temperatures and moisture regimen revealed moisture fluctuations during a 24-hour cycle. This investigation showed also that soil formation and glacial events go hand in hand. Soil development is thus a function of the age of the glacial deposits and the distance from the front of the glacier. Soils in the older moraines displayed a deeper profile, finer textures, a drier regimen, more salts and, to a certain degree, more reducible iron than the soils of younger moraines. This relation was further extended to the rest of Wright Valley.

3. Chemical Warfare Equipment and Materials

No Entries

4. Chemistry

AD-284 428 Div. 4, 10
OTS Prices: HC $3.00/MF $0.75

Rocket Power, Inc., Pasadena, Calif.
THERMODYNAMICS OF REACTIONS INVOLVING LIGHT METAL OXIDES AND PROPELLANT GASES.
Final rept. for 9 May 60-30 Jun 62,
by M. Farber, H. L. Petersen, J. A. Blauer, D. Brown, and J. Davis. 30 Jun 62, 66p
Contract DA04 495ORD1987 Unclassified report

Descriptors: (*Exhaust gases, Thermodynamics), (*Combustion chamber gases, Thermodynamics), (*Oxides, Thermodynamics), (*Oxyfluorides, Thermodynamics), Boron compounds, Aluminum compounds, Fluorides, Boric acids, Heat of reaction, Heat of formation, Entropy, Chemical equilibrium, Least squares method, Rocket motors, Combustion products, Thermochemistry.

The equilibrium, B2O3 (c,l) + BF3(g) = (BOF)3(g), was studied in the temperature range of 330-1000K by means of transpiration. The heat of reaction employing crystalline B2O3 was found to be 7.6 kcal/mole; while the liquid B2O3 yielded a heat of reaction of 2.4 kcal/mole. These lead to a value of -567.8±0.5 kcal/mole for the heat of formation of (BOF)3(g) and a value of 88.7± 2 cal/deg/mole for the entropy of (BOF)3(g). The thermodynamic properties of BOF were determined by means of a study of the reaction B2O3(l) + BF3(g) = 3BOF(g). A least squares analysis of the data gave values for the heat of formation and entropy (referred to a zero of entropy at 0K) for the gaseous monomer at 298K of -144± 6 kcal/mole and 53± 4 cal/deg/mole, respectively. A third law analysis of the data gave a value for the heat of formation for the same molecule at 298K of -142± 3 kcal/mole. The validity of the Molecular Flow Reaction Method was established in a study of the reaction between H2O and B2O3. A value for the heat of formation K of -135.6± 0.6 kcal/mole and a value for the entropy =61.1 ± 1.6 cal/degree/mole was obtained. The equilibrium, AlF3(g)+ Al2O3 (c) = 3AlOF(g), was studied at 2200K by use of an effusion cell. The value obtained for the heat of formation of AlOF, was -139±2.4 kcal/mole.

AD-299 140 Div. 4, 10, 25
OTS Prices: HC $1.00/MF $0.50

Rocket Power, Inc., Pasadena, Calif.
THERMODYNAMICS OF SEVERAL LIGHT METAL OXIDES, HALIDES AND OXYHALIDES.
Quarterly rept. no. 2, 9 Aug-9 Nov 62,
by J. A. Blauer, M. A. Greenbaum, and M. Farber.
9 Nov 62, 20p RPI-P-QR-3530-2
Contract DA04 495ORD3530, Proj. 004C ARPA Order 40 62
Unclassified report

Descriptors: (*Exhaust gases, Thermodynamics), (*Combustion chamber gases, Thermodynamics), (*Oxychlorides, Thermodynamics), (*Boron compounds, Oxychlorides), Aluminum compounds, Rocket motors, Combustion products, Heat of formation, Entropy, Chemical equilibrium, Oxides, Halides.

The reaction B2O3(l) + (BCl3(g) = (BOCl)3(g) was studied by the method of transpiration in the temperature range of 486K to 775K. The results are interpreted in terms of the heat of formation and entropy of (BOCl)3. The values obtained are: heat of formation at 298K = -405.7±0.3 kcal/mole and entropy at 298K = 91.3±0.4 cal/deg/mole. (Author)

AD-400 935 Div. 4, 10, 25
OTS Prices: HC $1.00/MF $0.50

Rocket Power, Inc., Pasadena, Calif.
THE THERMODYNAMICS OF SEVERAL LIGHT METAL OXIDES, HALIDES AND OXYHALIDES.
Quarterly rept. no. 3, 9 Nov 62-9 Feb 63,
by J. A. Blauer, M. A. Greenbaum, and M. Farber.
9 Feb 63, 12p
Contract DA04 495ORD3530, Proj. 004C
Unclassified report

Descriptors: (*Exhaust gases, Thermodynamics), (*Combustion chamber gases, Thermodynamics), (*Oxychlorides, Thermodynamics), (*Boron compounds, Oxychlorides), Aluminum compounds, Rocket motors, Combustion products, Heat of formation, Entropy, Chemical equilibrium, Oxides, Halides.

Previously (in AD-284 066), the heat of formation and entropy of the trimer (BOCl)3(g) were presented as a result of a study of the reaction B2O3(l) + BC13(g) = (BOCl)3(g). Final calibrations and corrections yield definitive values for the heat of formation and entropy of (BOCl)3(g) at 298K of -396.7±2 kcal/mole and 92.5 ± 2 cal/deg/mole, respectively. Work is also described concerning the study of the reaction 1/3B2O3(l) + 1/3BC13 (g)=BOCl(g) by a method of effusion. Preliminary experimental results of this low pressure, high temperature study indicate a heat of formation for BOCl(g) at 1279K of -76.3 kcal/mole as determined by the Third Law method. The reaction of Al2O3(l) + AlC13(g)=3Al)Cl(g) is under study in a specially designed effusion cell fabricated from rhenium. (Author)

AD-408 697 Div. 4, 10, 25
OTS Prices: HC $1.00/MF $0.50

Rocket Power, Inc., Pasadena, Calif.
THE THERMODYNAMICS OF SEVERAL LIGHT METAL OXIDES, HALIDES AND OXYHALIDES.
Final rept. for 9 May 62-8 Jun 63,
by J. A. Blauer, M. A. Greenbaum, M. Arshadi, and M. Farber. 8 Jun 63, 23p
Contract DA04 495ORD3530, Proj. 004C
N63 18886
Unclassified report

See also AD-400 935.

Descriptors: (*Exhaust gases, Thermodynamics), (*Combustion chamber gases, Thermodynamics), (*Oxychlorides, Thermodynamics), (*Boron compounds, Oxychlorides), (*Aluminum compounds, Oxychlorides), Rocket motors, Combustion products, Heat of formation, Entropy, Chemical equilibrium, Oxides, Halides, Oxyfluorides, Boric acids.

The report presents thermodynamic data on the thermodynamic properties of the oxyhalides of boron and aluminum. The thermodynamic properties including the standard heats of formation and standard entropies of formation for compounds stable only at high temperatures including BOF, (BOF)3, AlOF, (BOCl)3 and HBO2 were completed and have been published in the open literature. A study of the reaction B2O3(l) +BC13(g) = 3BOCl(g) was completed in the temperature range of 1234K to 1389K. A study of the reaction A12O3(l) + AlC13(g)= 3AlOCl(g) in the temperature range 2300K to 2400K was also completed. (Author)

AD-411 165 Div. 4, 7
OTS Prices: HC $2.00/None

Tyco Labs., Inc., Waltham, Mass.
ELECTROCHEMISTRY OF FUEL CELL ELECTRODES. ELECTROCHEMICAL BEHAVIOR OF NICKEL COMPOUNDS. II. ANODIC DISSOLUTION AND OXYGEN REDUCTION IN PERCHLORATE SOLUTIONS.
Technical memo no. 3, 16 Apr 62-15 Apr 63,
by A. K. M. S. Huq, A. J. Rosenberg, and A. C. Makrides.
1 Apr 63, 44p
Contract Nonr3765 00, Proj. NR359 443, ARPA Order 302 62
Unclassified report

See also AD-411 167.

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Electrochemistry), (*Nickel compounds, Electrochemistry), Nickel, Silicon, Antimony, Silicides, Antimony alloys, Arsenides, Sulfides, Perchlorates, Solubility, Electric currents, Oxidation, Acids, Bases (Chemistry), Oxides, Films, Catalysis, Oxygen, Reduction (Chemistry).

The anodic dissolution of Ni, Si, and Sb and of the compounds NiSi, NiSb, NiAs, and NiS was studied in molar perchlorate solutions at pH = 0.04 and 10.8. In all cases, except with Si in acid solution, active dissolution at low anodic potentials is followed by a transition to a passive state where the anodic current density is nearly independent of potential. In acid solution, the critical potentials of NiSi, NiAs, and NiS are less positive than that of Ni and the critical currents are less by two to three orders of magnitude. In alkaline solution, NiSi, NiSb, and NiS show an active-passive transition at the same potential as pure Ni. The electrocatalytic reduction of oxygen on nickel and nickel compounds occurs in the potential region where a passive film is stable. The order of catalytic activity for oxygen reduction is Ni> NiAs> NiSi in acid solution, and NiS > Ni> NiSi approximately = NiSb> NiAs in alkaline solution.

AD-411 167 Div. 4, 7
OTS Prices: HC $2.00

Tyco Labs., Inc., Waltham, Mass.
ELECTROCHEMISTRY OF FUEL CELL ELECTRODES. ELECTROCHEMICAL BEHAVIOR OF NICKEL COMPOUNDS. I. THE HYDROGEN EVOLUTION REACTION OF NiSi, NiAs, NiSb, NiSi, NiTe2 AND THEIR CONSTITUENT ELEMENTS.
Technical memo. no. 1, 16 Apr 62-15 Apr 63,
by A. K. M. Shamsul Huq and Arthur J. Rosenberg.
1 Apr 63, 34p
Contract Nonr3765 00, Proj. NR359 443,
ARPA Order 302 62
Unclassified report

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Electrochemistry), (*Nickel compounds, Electrochemistry), Silicides, Arsenides, Antimony alloys, Tellurides, Sulfides, Nickel, Silicon, Antimony, Tellurium, Reaction kinetics, Hydrogen, Hydrides, Atomic properties, Crystal structure, Catalysis.

AD-426 487 Div. 4
OTS Prices: HC $1.00

Washington Univ., Seattle.
THE PREPARATION AND PROPERTIES OF TRIFLUOROMETHOXY SULFURPENTAFLUORIDE, CF3OSF5 AND CIS-BIS (TRIFLUOROMETHOXY) TETRAFLUOROSULFUR(VI) (CF3O)2SF4.
Technical rept. no. 44,
by Leonard C. Duncan and George H. Cady. 1963, 12p
Contract Nonr477 16, ARPA Order 26 60, Task no. 2
Unclassified report

Presented at the Northwest Regional Meeting of the American Chemical Society, June 20, 1962.

Descriptors: (*Fluorides, Synthesis (Chemistry)), (*Organic sulfur compounds, Fluorides), Photochemistry, Ultraviolet radiation, Oxyfluorides, Molecular structure, Mass spectroscopy, Infrared spectroscopy, Nuclear magnetic resonance.

Trifluoromethoxy sulfurpentafluoride and cis-bis (trifluoromethoxy) tetrafluorosulfur(VI) were prepared by the ultraviolet irradiation of gaseous mixtures of SF4 with either CF3OF or CF3OOCF3. The products were characterized, and the structures confirmed by mass, infrared, and nuclear magnetic resonance spectra. (Author)

Patent 3,149,908 Div. 4

OXYCHLORIDES OF PENTAVALENT NEPTUNIUM.
AEC-assigned Patent,
by Theodore J. La Chapelle, Jr. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Neptunium compounds) (*Oxychlorides, Neptunium compounds), (*Neptunium compounds, Oxychlorides), Acids, Solutions, Ions, Preparation.

Pentavalent oxychlorides of neptunium are prepared by oxidizing tetravalent neptunium ions contained in an acidic aqueous solution with chloride ions to the pentavalent state, dehydrating the solution and recovering the oxychlorides.

Patent 3,150,101 Div. 4

ION EXCHANGE RESIN WITH SCINTILLATING PROPERTIES.
AEC-assigned Patent,
by Alvin H. Heimbuch. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ion exchange resins), (*Ion exchange resins, Fluorescence), Vinyl plastics, Styrene plastics, Sulfonates, Polycyclic compounds, Synthesis (Chemistry).

The scintillating cation exchange resin consists of a bead of a polymer selected from the group consisting of polyvinyltoluene and polystyrene, p-terphenyl, a material such as diphenylstilbene and sulphonic groups. A method is also disclosed of making the composition.

Patent 3,150,124 Div. 4, 16

SYNTHESIS OF KINETIN GLYCOSIDES.
Army-assigned Patent,
by George Svarnas and Herman Rutner. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Glycosides), (*Glycosides, Synthesis (Chemistry)), Purines, Reduction (Chemistry).

Kinetin riboside is made by furoylating adenosine with 2-furoyl chloride and reducing the resulting 6-furoylamino-9-(tri-O-B-D-ribofuranosyl) purine with a mild reducing agent to form the kinetin riboside.

Patent 3,150,163 Div. 4, 14

PENTAFLUOROBENZONITRILE AND METHOD OF MAKING THE SAME.
Navy-assigned Patent,
by Walter J. Pummer and Leo A. Wall. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nitriles), (*Nitriles, Patents), (*Fluorine compounds, Nitriles), Synthesis (Chemistry), Polymers, Halocarbon plastics, Lubricants.

The compositions are useful as intermediates for fuel-resistant polymers and lubricating liquids. Pentafluorobenzonitrile is claimed.

Patent 3,150,923 Div. 4

PROCESS FOR REMOVING SULFUR DIOXIDE FROM GASES.

Interior-assigned Patent,
by Daniel Bienstock and Joseph H. Field. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Waste gases), (*Waste gases, Processing), (*Sulfur compounds, Dioxides), Absorption, Manganese compounds, Oxides, Sulfates.

The process involves separation of sulfur dioxide from waste gases by contacting the waste gases with an absorbent material comprising solid manganese oxide. The reaction of the sulfur dioxide in the waste gases with the manganese oxide results in the formation of manganese sulfate which is then treated to regenerate the manganese oxide. By means of such a process the sulfur dioxide is removed from the waste gases without effecting cooling of the waste gases thus avoiding the undesirable effects of cooling.

Patent 3,152,868 Div. 4

PREPARATION OF SCANDIUM HYDRIDES.
AEC-assigned Patent,
by Charles P. Kempter and Joseph C. McGuire.
13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Scanduim compounds), (*Scandium, Hydrides), (*Hydrides, Scandium), Preparation, Heat, Hydrogen, Isotopes, Temperature, Pressure, Particle accelerator targets.

The hydrides of scandium can be used as target materials in a particle accelerator or as a simple detector unit for discovering uranium ore bodies. It is prepared by heating scandium metal in the presence of a hydrogen isotope at 450 degrees C. and at slightly less than atmospheric pressure.

Patent 3,152,887 Div. 4

AMERICIUM-CURIUM SEPARATION.
AEC-assigned Patent,
by Stephen Lawroski, James B. Knighton and Robert K. Steunenberg. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Material seperation), (*Americium, Material seperation), (*Curium, Material seperation), Mixtures, Magnesium, Halides, Zinc alloys, Magnesium.

The process includes introducing a curium- and americium-containing mixture into a molten magnesium-halide-containing flux; adding magnesium in the form of a binary magnesium-zinc alloy thereto, whereby the curium values are taken up by the alloy as the metal, while americium halide is dissolved or suspended in the flux; and separating a metal phase. The metals are used in nuclear applications.

Patent 3,153,659 Div. 4, 29

CAFFEOYL GLYCERIDES.
Agriculture-assigned Patent,
by Harold G. C. King. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ethers), (*Antioxidants, Synthesis (Chemistry)), (*Food, Preservation), Fats, Oils, Stabilization.

The products are for stabilizing foodstuffs, feeding stuffs, fats and oils, against antioxidant activity. A compound 1-mono-caffeoyl glycerol is claimed.

5. Communications

Patent 3,151,296 Div. 5, 8, 30

METHOD AND SYSTEM FOR TRANSMISSION OF COMPANDED PULSE CODE MODULATED INFORMATION.
Army-assigned Patent,
by Douglas L. Phyfe. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse communication systems), (*Pulse communication systems, Patents), Data transmission systems, Pulse transmitters, Pulse modulation, Communication theory, Coding, Design.

The companded delta pulse code modulation system includes a delta pulse code modulation coder fed by an analog input such as a speech signal. The coder is coupled to a logic stage which provides an input for a transmitter. A feedback loop, to provide a reference voltage, is provided from the logic stage to the coder and includes a decoder and a switch.

Patent 3,151,312 Div. 5, 8, 30

ELECTRONIC REAL TIME STATISTICAL ANALYZER.
Navy-assigned Patent,
by Hugo M. Beck. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Data processing systems), (*Data processing systems, Real time), Statistical analysis, Binary arithmetic, Electronic equipment, Communication systems, Design.

The data processing system is for statistically analyzing a binary series of information in real time with respect to a clock pulse. An information series is analyzed in real time from telemetering systems, physical systems and communication systems including both audio and visual without the need for large scale storage systems.

6. Detection

Patent 3,149,280 Div. 6

MAGNETOMETER SUPPORTING GIMBAL SYSTEM HAVING SEGMENTED FRAME MEMBERS WITH RELATIVELY HIGH IMPEDANCE BONDING THEREBETWEEN.
Navy-assigned Patent,
by Joel H. Gregowski. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,

Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Magnetometers), (*Magnetometers, Gimbals), (*Gimbals, Magnetometers), Underwater object locators, Magnetic fields, Detectors, Airborne, Stabilization systems.

The magnetically inert gimbal is for position-stabilizing a sensitive ambient magnetic field detector. The magnetic detecting system, using sensitive magnetometers, is used in low flying aircraft to detect submerged articles such as submarines. The gimbal is adaptable in combination with similar gimbals and position-responsive servo motors for stabilizing the detector in a prescribed orientation relative to the ambient magnetic field of the earth.

Patent 3,149,333 Div. 6

DETECTION OF TARGETS IN CLUTTER.
Navy-assigned Patent,
by Robert R. Campbell. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Doppler radar), (*Doppler radar, Radar clutter), (*Radar clutter, Target discrimination), Circuits, Automatic gain control, Radiofrequency filters.

The pulse-Doppler radar receiver has a circuit for detecting targets in clutter. An automatic gain control voltage is developed which holds the clutter amplitude of each filter channel group just below the threshold of the threshold detectors, eliminating clutter from real target signals.

Patent 3,150,331 Div. 6, 8

TRAVELING WAVE TUBE PHASE COMPENSATION CIRCUIT.
Navy-assigned Patent,
by Sheldon I. Rambo. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Traveling-wave tubes), (*Traveling-wave tubes, Circuits), (*Radar equipment, Traveling-wave tubes), (*Circuits, Phase control devices), Voltage, control, Radar signals, Modulators, Cathodes (Electron tubes).

A grid modulator voltage control is provided to compensate for cathode voltage droop of a grid controlled traveling wave tube sufficient to eliminate phase change of RF signals being amplified in the TWT. The circuit is used in a radar system.

Patent 3,150,368 Div. 6, 8

PULSE COMPRESSION RESIDUE BLANKING.
Navy-assigned Patent,
by Richard C. Price. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse compression), (*Pulse compression, Radar receivers), Radar echo areas, Radar targets, Radar reflections, Filters (Electromagnetic wave), Circuits, Detectors.

A pulse compression radar receiver is provided with residue blanking circuitry to provide pulse compressed echo target signals free of residue. The system includes a radar receiver, a pulse compression filter circuit, a detector and a subtractor circuit.

Patent 3,150,369 Div. 6, 19

RADAR RANGE SIMULATOR.
Navy-assigned Patent,
by Mario W. Fontana. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Range finding), (*Range finding, Radar equipment), Ranges (Distance), Simulators, Pulse generators, Radar signals, Radar reflections, Altimeters.

The radar range simulator produces delayed echo pulses for use in conjunction with a pulse-type radar altimeter by accurately controlling elapsed time between the transmitted pulse and the provision of the simulated echo pulse to the receiver. A simulated echo pulse is connected to the radar receiver in response to the occurrence of any selected one of the pulses in a pulse train generated by nanosecond pulse generator which is triggered on by the transmitted pulse from the radar system to be tested. The system of the present invention simulates any one of an almost infinite number of ranges.

Patent 3,153,156 Div. 6

PRESSURE-PROOF CERAMIC TRANSDUCER.
Navy-assigned Patent,
by Frank W. Watlington. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electroacoustic transducers), (*Electroacoustic transducers, Underwater), Piezoelectric crystals, Discs, Coatings, Electrical conductance, Rings, Sandwich construction, Ceramic materials.

The transducer is for underwater use. It is made up of at least two discs of piezoelectric material, the flat surfaces of the discs bearing electrically conductive coatings, and at least one annular spacing ring for insertion between the discs so that the discs and ring form a sandwich structure.

Patent 3,153,231 Div. 6

MODIFICATION OF SEQUENTIAL DETECTORS FOR PARALLEL OPERATION.
Navy-assigned Patent,
by James W. Caspers and Robin A. Worley.
13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Monitors), (*Monitors, Radar signals), (*Radar signals, Monitors), Search radar.

The sequential detector processes radar, or other data, for signal detection purposes. The system utilizes sequential signal detectors connected in a modified parallel sequence to increase the search rate of the system through forcing all detectors to use all of the radar data.

Patent 3,153,770 Div. 6

SONAR ECHO SIMULATOR.
Navy-assigned Patent,
by Myron L. Feistman, David A. Reinhart, and Robert F. Kantner. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Sonar equipment), (*Sonar signals, Simulation), Simulators, Identification systems, Calibration.

The simulator receives directly the high voltage, high frequency output of the sonar transmitter, attenuates and detects this signal, adds a known and desired delay to the detected signal, then feeds back to the sonar receiver a signal having the initial frequency of the transmitter, attenuated and delayed by an amount representative of the water depth or target distance to be displayed by the measuring equipment. Therefore, knowing the actual delay and the represented water depth or target distance corresponding thereto the measuring equipment may readily be calibrated.

Patent 3,153,786 Div. 6, 8

MOVING TARGET INDICATOR CANCELLER.
Army-assigned Patent,
by Roy E. Byington. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Delay circuits), (*Delay circuits, Moving target indicators), (*Moving target indicators, Delay circuits), Delay lines, Pulse generators, Design.

The MTI system has a delay line cancellation circuit the delay line forming a closed loop with a reference or pilot pulse generator. The closed loop also includes a variable delay and gain control with elements responsive to the output of the cancellation circuit for controlling the variable delay and the gain control with other elements coupling the output of the reference pulse generator to the MTI transmitter to thereby control the pulse repetition frequency.

PB-166 521 Div. 6
OTS Prices: HC $6.00/MF $1.50

Perkin-Elmer Corp., Norwalk, Conn.
ASTRO-OPTICAL TRACKER STUDY.
Final rept.,
by Thomas P. Fahy. Aug 60, 224p PE-TR-5549A
Contract AF08 635 262, Proj. 8852
APGC TR60 42; AD 241 426
Unclassified report

Descriptors: (*Tracking telescopes, Design), (*Optical tracking, Telescopes), (*Telescopes, Optical tracking), Guided missiles, Rockets, Satellites (Artificial), Detection, Identification systems, Optical equipment, Radiometers, Atmosphere, Optical properties, Cameras, Detectors, Systems engineering.

The design of an optimum Astro-Optical Tracker Telescope was studied for the detection and recognition of missiles, rockets, and satellites at maximum range. The basic technique used in this study involves expressing all pertinent quantities in the frequency response, or transform method. To facilitate the study, the problem was broken down into The External System, The Detection System, and the Optical System. In this approach, the characteristics of the External System, and the Detection System were first determined. The Optical System was then designed to use these two sets of information to the best advantage. A recommendation is made for the construction of a telescope of 48-inch diameter and 1000-inch focal length. A specification is presented for such an instrument and its associated finder telescope. Some consideration was given to the various mechanical considerations and the accessory equipment necessary for operation of an Astro-Optical Tracker Telescope. Optimum designs were also determined for the visual system to be used for the finder telescope; the television system using the main telescope, and infrared applications. The study recommends the best compromise of the telescope design to accomplish all of these methods of operation with the various detectors without too much complication of basic design.

7. Electrical Equipment

AD-269 594 Div. 7, 4
OTS Prices: HC $3.00/None

Monsanto Research Corp., Everett, Mass.
RESEARCH ON ORGANIC DEPOLARIZERS.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 61,
by B. A. Gruber and E. A. McElhill. 31 Oct 61, 66p
Contract DA36 039SC87336, Proj. 3A99 09 002
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Primary cells, Organic materials), (*Cathodes (Electrolytic cells), Organic materials), (*Nitrobenzenes, Electrochemistry), Electrolytic cells, Catalysts, Platinum, Porosity, Polarization, Voltage, Electrolytes, Magnesium, Magnesium compounds, Bromides, Benzoates, Fluorides, Chlorides, Surface-active substances.

In attempting to set up a reproducible m-dinitrobenzene (m-DNB) half cell against which new organic depolarizers could be evaluated, several areas were defined that, if successfully exploited, could substantially increase the cathode voltage beyond any increase to be expected from new organic materials. Platinum catalysts increased the open circuit voltage of m-DNB cathodes by approximately 0.3 volt. Improving the pore structure of the cathode mix could be expected to add an additional 0.1 to 0.2 volt to the cathode potential. Improving the method of dispersing the depolarizer in the cathode mix can substantially improve the cathode capacity at high current drains. None of the new depolarizer materials tested improved the half-cell characteristics compared to m-DNB. (Author)

AD-278 496 Div. 7, 4
OTS Prices: HC $2.00/MF $0.50

Tyco Labs., Inc., Waltham, Mass.
ELECTROCHEMISTRY OF FUEL CELL ELECTRODES.
Quarterly letter rept. no. 2,
by Arthur J. Rosenberg. 15 Jan 62, 28p
Contract NObs 84770, Proj. SR007 12 01, ARPA Order 204 61, Task 809
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Fuel cells), Electrochemistry, Preparation, Nickel electrodes, Zinc, Aluminum, Gallium, Oxides, Sulfides,

Polarization, Wet cells, Intermatallic compounds, Cobalt, Silicon.

The objective of the present research is the correlation of electrode behavior with the electronic properties of electrode materials with incompletely occupied d-orbitals. This report describes the continuation and extension of the work described in an earlier report1. One part of the program has been the preparation and characterization of new electrode materials. In the second part of the program, the electrochemical behavior of the materials has been studied in various media and the results partially analyzed.

Patent 3,149,897 Div. 7, 8

PRINTED CABLE CONNECTOR.
NASA-assigned Patent,
by Hans G. Martineck. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric connectors), (*Electric connectors, Printed circuits), (*Printed circuits, Electric connectors), Electric cables, Springs, Loading (Mechanics).

A connector is provided wherein the contact elements are not subject to being displaced on the application of a plug. A body member is provided with an elongated rectangular opening in it. It retains curved spring contact elements for contact with conductors in an associated plug. The spring contact elements are provided with hooked ends and an internal 'foot' mating or interfitting with the internal configuration of the connector housing whereby the contacts resist deformation and displacement on insertion of plug members.

Patent 3,150,008 Div. 7

GALVANIC BATTERY ELECTRODE.
Navy-assigned Patent,
by William G. Darland, Jr. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Batteries and components), (*Batteries, and components, Projectiles), Electrodes, Electrochemistry, Lead compounds, Oxides.

The electrochemical battery is for use in a spinning projectile. A new variety of oxide of lead is used on one of the electrodes of the reserve energizer which serves as a depolarizer. A highly active form of PbO2 is used.

Patent 3,150,009 Div. 7

GALVANIC BATTERY.
Navy-assigned Patent,
by Howard S. Pattin. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Batteries and components), (*Batteries and components, Projectiles), Electrochemistry.

The electrochemical energizer or battery is for use in a projectile. An arrangement of the cell sections is employed whereby adequate filling of each section is insured.

Patent 3,150,010 Div. 7

ELECTROLYTE CONTROL FOR A BATTERY.
Navy-assigned Patent,
by Clark C. Cleveland. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Batteries and components), (*Batteries and components, Electrolytes), (*Electrolytes, Control), Primary cells, Design.

The deferred action type battery is used in a projectile. A reserve energizer of the split stack type is provided with a construction insuring that the electrolyte is properly distributed to each of the sections. A hood type construction is provided over one of the sections to effect or uniform filling of the battery with electrolyte by the centrifugal forces acting thereon.

Patent 3,150,291 Div. 7

INCREMENTAL ELECTRICAL METHOD AND APPARATUS FOR ENERGIZING HIGH CURRENT SUPERCONDUCTING ELECTROMAGNETS.
AEC-assigned Patent,
by Henry L. Laquer. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Superconductors), (*Superconductors, Patents), Electromagnets, Coils, Magnetic fields, Switching circuits.

The apparatus is for energizing superconducting magnet coils. The basic principle utilized is termed 'flux-pumping.' This consists essentially of repetitively injecting magnetic flux into an auxiliary superconducting coil or loop from an external source and by appropriate switching techniques transferring a portion of the flux from the auxiliary coil into the main coil.

Patent 3,150,308 Div. 7, 8

POWER SUPPLY HAVING SIMULATED FIELD CONDITIONS.
Navy-assigned Patent,
by Robert F. Kantner and Myron L. Feistman.
22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, 0.25

Descriptors Patents, Power supplies, Power supplies, Electrical equipment, Laboratory equipment, Transistors, Resistors.

The apparatus supplies an electrical power signal to electrical motors and other equipment. The power supply is for laboratory or other ideal condition uses having a predetermined desired imperfect signal output. Components utilized include a transistor of the NPN Delco ZN173 type and several resistors.

Patent 3,152,815 Div. 7, 11

INTRA VEHICLE MECHANICAL CONNECTOR.
Army-assigned Patent,
by Achille R. Barragato and Ernest F. Smith.
13 Oct 64
Unclassified patent

Available from Commissioner of Patents,

Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric connectors), (*Electric connectors, Vehicle chassis components), (*Vehicle chassis components, Electric connectors), Towed vehicles, Towing vehicles.

The manual electrical connector has quick-connect and quick-disconnect features together with an automatic disconnect structure for emergency conditions. The connector may be used in intra-vehicular arrangements which incorporate a standardized electrical contact and is used to connect the prime mover vehicle to any trailer type unit.

Patent 3,153,735 Div. 7

INERTIA ELECTRO-MAGNETIC GENERATOR.
Navy-assigned Patent,
by Edward F. Branagan and Maurice E. Shindiedecker.
20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Generators), (*Generators, Magnetic moments), Voltage, Moment of inertia, Magnets.

The magnetic inertia generator delivers a large electrical voltage output due to a small mechanical force. The electrical output is independent of mechanical displacement of a magnetic keeper as a function of time. It is adjustable.

8. Electronics and Electronic Equipment

AD-274 022 Div. 8, 25, 26
OTS Prices: HC $4.00/None

Materials Advisory Board, NAS-NRC, Washington, D. C.
REPORT OF THE MATERIALS ADVISORY AD HOC PANEL ON THE MANUFACTURE OF ADVANCED ELECTRONIC COMPONENTS.
23 Feb 62, 139p
Contract SD-118
MAB 182M
Unclassified report

Descriptors: (*Electronic equipment, Manufacturing methods), Semiconductor devices, Electron tubes, Microwave equipment, Resistors, Capacitors, Single crystals, Magnetic materials, Microminiaturization (Electronics), Modules (Electronic), Electrophotography, Masers, Lasers, Reports, Spaceborne, Reliability (Electronics), Economics, Design.

Topics include: Electronics panel study of ASD program; Advanced aerospace requirements in electronic components; Electronics panel study of future electronic component requirements. Reports are included on the following subjects: semiconductor devices; resistors, capacitors, single crystals, magnetic materials, microelectronics and electronic photography, and masers and lasers.

AD-285 041 Div. 8, 25
OTS Prices: HC $3.00/None

IBM Command Control Center, Federal Systems, Div., Kingston, N. Y.
PLANAR INTEGRATION OF THIN FILM FUNCTIONAL CIRCUIT UNITS.
Quarterly rept. no. 3, 1 Mar-31 May 62,
by W. N. Carroll, F. F. Jenny, F. L. Stutz, K. B. Scow, and P. C. Karr. 31 May 62, 58p
Contract DA36 039sc87246, Proj. 3G26 14 001,
Task 3G26 14 031 01
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-275 275, AD-401 183.

Descriptors: (*Thin films (Storage devices), Integrated circuits), (*Integrated circuits, Thin films (Storage devices)), (*Semiconductor devices, Microminiaturization (Electronics)), Vacuum apparatus, Soldering, Evaporation, Coatings, Carbon compounds, Monoxides.

Integration Techniques: Four process and material changes to the solder attachment technique are discussed, along with data obtained during environmental tests. Process Controls: A description is given of the improvements made to the basic vacuum evaporation process including improved source designs, and methods of evaporating various forms of silicon monoxide. A discussion of substrate surface requirements is presented along with new specifications for procuring substrates. Details relating to the fabrication techniques for jumpers and interconnections are presented. Functional Assemblies: The selected packaging format for the functional assemblies is described along with the results of mechanical tests conducted. A description of tests designed to determine the electrical noise susceptibility of the functional assemblies is presented, along with the data obtained. Data on the spread and tolerance of the film resistors contained on 27 functional assemblies is presented. (Author)

AD-294 483 Div. 8
OTS Prices: HC $2.00

David Sarnoff Research Center, Princeton, N. J.
LOW-NOISE MICROWAVE TUBES.
Final rept., for 1 Sep 60-15 Oct 62,
by S. Bloom, A. L. Eichenbaum, J. M. Hammer, and B. Vural. 14 Nov 62, 36p
Contract DA36 039sc87393, Proj. 3 99 15 504
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cathodes (Electron tubes), Microwave equipment), (*Traveling-wave tubes, Noise (Radio)), (*Electron guns, Traveling wave tubes), S band, Electron tubes, Oxide cathodes, Electron beams, Helixes, Plasma physics, Reduction, Lithium compounds, Aluminum compounds, Silicon compounds, Dioxides, Design, Theory, Equations.

Measurements of the noise spectra S and Pi and of the noise figure were made, via the Pi Apparatus, on several S-Band low-noise TWT guns of identical design. The best noise figures were below 4 db; hence the data are pertinent to the ultra-low-noise mode of TWT operation. It was found that the correlation Pi/S sub o has a constant positive value of about 0.4 for positive values of the beam-forming voltage and that the increase in noise factor accompanying the formation of a virtual cathode is due to an increase of S/S sub o. For large negative beam-forming voltages, Pi/S sub o is near zero and S/S sub o near unity. Measurements of the noise figures of two S-Band TWTs employing beta-eucryptite plasma cathodes were made. The first tube, using a L-cathode as the electron emitter, gave 5.7 db when the Li-ions were present and 10 db when the eucryptite ion source was off. The second tube, using an oxide cathode, gave 4.9 db with ions and about 6 db without ions. Both the Land the oxide cathods were in poor condition. The noise factors decreased to the above values as the length of the low-voltage plasma region

was increased. Retarding-field measurements of low-noise beams revealed a steady increase in electron temperature for the increasingly dense edge-current as the beam-forming voltage is raised. (Author)

AD-400 144 Div. 8
OTS Prices: HC $3.00/None

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
PROPERTIES OF RING-PLANE SLOW-WAVE CIRCUITS.
Interim rept. for Apr-Dec 62,
by R. M. White, C. E. Enderby, and C. K. Birdsall.
Mar 63, 85p R62ELM233-4
Contract AF33 657 8360, Proj. 4156, Task 41533
ASD TDR63 224

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Traveling-wave tubes, Coupling circuits), (*Coupling circuits, Traveling-wave tubes), Circuits, Delay lines, Rings, Microwave amplifiers, High frequency, Propagation, Electrical properties, Feasibility studies.

The electrical properties of the 'ring-plane' family of slow-wave circuits are described. These circuits are very large in useful cross section and hence are well suited for use in high-power, high-frequency traveling-wave tubes. They consist generally of a set of electrically conducting circular rings supported by one or more conducting planes. Propagation characteristics (omega-beta diagrams, field structure, and mode properties) and interaction impedances for a number of ring-plane circuits are summarized here, showing in detail how such circuits behave and giving essentially all parameters needed for use in traveling-wave tube design. (Author)

AD-408 287 Div. 8, 7
OTS Prices: HC $2.00

Mitre Corp., Bedford, Mass.
A GENERAL METHOD TO COMPUTE THE CHARACTERISTICS OF MICROSTRIP TRANSMISSION LINES.
Final rept.,
by J. W. S. Liu. May 63, 30p W-5490
Contract AF33 600 39852, Proj. 708
ESD TDR63 238

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transmission lines, Mathematical analysis), (*Electromagnetism, Transmission lines), Monti Carlo method, Partial differential equations, Static electricity, Electric fields, Capacitance, Voltage, Electrical impedance, Programming languages, Programming (Computer), Design.

A general method to compute the parameters of microstrip transmission lines is described. Here, the values of the potential function are estimated by solving the Laplace equation using the Monte Carlo method. The electric field strength is then computed by differentiating the potential function. From the electric field distribution, the charge density on the surface of center conductor, the associated capacitance per unit length of the line, the characteristic impedance, and the conductor loss of the line is computed. A Fortran program has been prepared and the flow chart of the program is included and described in this paper. The program was used to estimate the characteristic impedance of lines of three different geometrics. Results are within ten percent of the experimentally measured values. (Author)

AD-408 961 Div. 8, 25
OTS Prices: HC $5.00

Research Triangle Inst., Durham, N. C.
INTEGRATED SILICON DEVICE TECHNOLOGY.
VOLUME I. RESISTANCE.
Rept. for Jan-Apr 63,
Jun 63, 166p
Contract AF33 657 10340, Proj. 4159, Task 415905
ASD TDR63 316 V1

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-423 148.

Descriptors: (*Resistors, Integrated circuits), (*Semiconducting films, Resistors), (*Integrated circuits, Resistors), (*Silicon, Integrated circuits), Electrical conductance, Temperature, Pressure, Low-temperature research, High-temperature research, Vapor plating, Molecular electronics, Metal films, Nickel alloys, Chromium alloys, Carbon, Metal coatings, Tantalum, Manufacturing methods, Resistance (Electrical).

Conventional and unconventional methods of achieving the resistive function in integrated silicon devices are discussed. The properties and types of resistors made of silicon are considered in some detail as well as general design procedures. Many charts and graphs are reproduced in the hope of providing a convenient source of information pertinent to the design of resistors for integrated silicon devices. The more recent trend toward combining thin film passive components on a silicon substrate containing the active elements is discussed in less detail, not because this technique is felt to be less important but because information is sparse on such devices and their fabrication.

AD-423 148 Div. 8, 25
OTS Prices: HC $4.00/None

Research Triangle Inst., Durham, N. C.
INTEGRATED SILICON DEVICE TECHNOLOGY.
VOLUME II. CAPACITANCE.
Rept. for Feb-Jun 63.
Oct 63, 142p
Contract AF33 657 10340, Proj. 4159, Task 415905
ASD TDR63 316 V2

Unclassified report

See also AD-408 961.

Descriptors: (*Integrated circuits, Silicon), (*Semiconductor devices, Integrated circuits), Manufacturing methods, Capacitance, Dielectric films, Oxides, Theory, Voltage, Transistors, Metals, Temperature, Modules (Electronic), Metal films, Electric fields, Electrical conductance, Diodes (Semiconductor), Capacitors, Electrical properties, Molecular electronics.

This report presents the theory, design parameters, and fabrication methods for capacitive regions in integrated silicon structures. Techniques for obtaining nominal design parameters based upon the capacitance of p-n junctions, thin film dielectrics, and the metal-oxide-silicon structure (MOS) are presented. The discussion is separated into three parts. First, three distinct capacitive structures - p-n junction, thin film, and MOS - are described. Included in these sections are phenomenological discussions pertaining to the included data. Next, the general design problem for applying each of the three techniques is outlined. A contrasting evaluation of the three approaches is included with examples of capacitive regions in functional electronic blocks. (Author)

AD-433 730 Div. 8, 25
OTS Prices: HC $3.00

hp associates, Palo Alto, Calif.

PHOTON COUPLED CIRCUITS,
by Irwin Wunderman. Jan 64, 95p
Contract AF33 657 9772, Proj. 4159, Task 415910
RTD TDR63 4260

Unclassified report

Descriptors: (*Photons, Coupling circuits), (*Coupling circuits, Photons), Gallium alloys, Arsenic alloys, Diodes (Semiconductor), Injection, Luminescence, Light transmission, Phototubes, Photoelectric cells (Semiconductor), Optics, Electronics, Solid state physics.

When appropriately-fabricated gallium arsenide diodes are biased in the forward direction, they emit a narrow band of radiation in the near infrared. This mechanism, termed 'injection luminescence,' has achieved a state of technological perfection which permits exploitation as an active electronic device. This Report describes the capabilities of circuits which can be made by mating these emitting sources to suitable photodetectors, forming 'photon-coupled pairs.' The unique properties of such configurations are isolation of input and output circuits, and unilateral signal transfer. The presentation uses a format which attempts to bridge the gap between optical and electrical terminology, and retain high compatibility with semiconductor physics. Numerous applications of general interest are outlined and specific examples are presented in detail. (Author)

AD-438 452 Div. 8
OTS Prices: HC $3.00/MF $None

Sperry Gyroscope Co., Great Neck, N. Y.
SUPERPOWER MICROWAVE WINDOWS.
Rept. no. 17 (Final), 2 Jan 63-1 Jan 64,
by D. B. Churchill. Jan 64, 84p NA-8240-8372
Contract DA36 039AMC02161E, Continuation of Contract DA36 039sc78314, Task 1G6 22001A055 01 06

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-431 260.

Descriptors: (*Waveguide windows, Microwave equipment), (*Microwave equipment, Waveguide windows), (*Electron tube parts, Waveguide windows), Dielectrics, Materials, Electron tubes, C band, Power, Reliability (Electronics), Test methods, Theory, Experimental data.

Development of successful superpower windows depends on understanding and controlling the factors that limit the power-carrying capacity. The principal factors are window seal arcing, spurious mode resonances, dielectric material weaknesses, structural defects, adverse environment, and multipactor discharge. Window designs are selected with the objective of minimizing these factors. All of the existing window configurations are shown to be derived from ten basic designs. The group of ten also included designs that are considered practical, but have not yet been tested. The double rectangular plate window, the double-disc window, the circular electric mode window, and the side-wall coupler window were selected for study and evaluation. Evacuated C-band windowtrons--sections of waveguide sealed by two windows--were constructed to test the power-carrying capacities of the double rectangular plate window and the double-disc windows. The windows failed at 12.5 megw and 31.5 megw, respectively. A structural defect caused arcing that led to failure of the double rectangular plate window. Failure of the double-disc window was attributed to multipactor. A circular electric mode window disc was tested in an evacuated resonant cavity. (Author)

CAPE-1036 Div. 8

Lawrence Radiation Lab., Univ. of California, Berkeley.
LINEAR AMPLIFIER SYSTEM-11X1980.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Amplifiers, Mechanical drawings), Frequency analyzers, Gates (Circuits), Noise generators, Pulse generators, Delay lines, Electronic equipment.

Drawings (343) are presented for equipment known as the 198 system. The system has a variety of uses. The system contains a pulse-shaping amplifier, crossover timing unit, single channel analyzer, fast coincidence, linear gate and slow coincidence, biased amplifier and pulse stretcher, subtractor and expander amplifier, noise generator, pulse generator, ramp pulse generator, tail pulse generator, delay amplifier, delay lines, and a rate meter. The system occupies seven in. of space in a standard rack 19 in. wide. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1079 Div. 8, 5

Los Alamos Scientific Lab., N. Mex.
SINGLE CHANNEL ANALYZER.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Frequency analyzers, Mechanical drawings), (Electronic equipment).

Four drawings are included that show the schematics of the analyzer, gate generator, printer relay chassis and delay, and the gating circuits. A Model 61 power supply is used to provide regulated B+ bias and filament power for heavy chassis loads. The delay and gating uses a Model 51 power supply to provide regulated B+ bias and filament power for ordinary chassis loads. (AEC abstract)

CAPE-1111 Div. 8, 20

Los Alamos Scientific Lab., N. Mex.
LASL ELECTRONICS COMPONENTS, GROUP 2.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Electronic equipment, Mechanical drawing), Amplifiers, Pulse generators, Photomultipliers, Delay circuits, Count-rate meters, Proportional counters.

Drawings (17) are presented for a group of electronic components that include amplifiers, preamplifiers, power supply pulsers, coincidence systems, rate meter, proportional hand counter, delay unit, and a mounting for a photomultiplier tube. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

Patent 3,144,538 Div. 8

COAXIAL CIRCUIT SHIFTER.
Army-assigned Patent,
by William A. Etter. 11 Aug 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Coaxial cables), (*Coaxial cables, Transfer switches), Circuits, Transmission lines.

A structure is provided whereby a coaxial line may be

selectively shifted from one coaxial line without utilizing the 'switching' methods of the prior art. The entire coaxial line is, in effect, shifted from one circuit to another circuit.

Patent 3,147,435 Div. 8, 30

STRIP LINE PHASE COMPARATOR.
Navy-assigned Patent,
by Donald J. Blattner. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Phase detectors), (*Phase detectors, Specifications), Copper, Metal plates, Halocarbon plastics, Dielectric properties, Coaxial cables, Variable capacitors, Oscillators.

The phase comparator is for use in comparing the phase of oscillation of two strip line subharmonic oscillators, The phase comparator is for use in information handling systems. The structure includes a copper ground plate, a 'Teflon' dielectric, coaxial connectors, two variable capacitors, two subharmonic oscillators, and a copper strip tank circuit.

Patent 3,147,438 Div. 8

SIGNAL-TO-NOISE RATIO SENSOR FOR FREQUENCY MODULATION RECEIVER.
Navy-assigned Patent,
by Earl G. Hedger and Charles G. Wilhelm. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Monitors), (*Signal-to-noise ratio, Monitors), (*Monitors, Signal-to-noise ratio), Frequency modulation, Radio receivers, High-pass filters, Rectifiers, Trigger circuits, Gates (Circuits).

The system is for monitoring the output signals of a detector adapted to detect a frequency-modulated carrier having fixed-frequency deviation. The system includes a high-pass filter, two rectifiers, two trigger circuits, and AND gate and an element for passing signals exceeding a predetermined amplitude.

Patent 3,147,452 Div. 8, 5

CONSTANT IMPEDANCE VARIABLE DELAY LINE.
Air Force-assigned Patent,
by Thomas G. Knight. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Delay lines), (*Delay lines, Patents), Electrical impedance, Inductance, Capacitance, Design.

A continuously variable delay line is provided. It includes inductance and capacitance sections wherein the values of the capacitance and inductance are varied simultaneously, thereby varying the amount of delay in the line while retaining a constant inductance and capacitance ratio.

Patent 3,149,292 Div. 8

FREQUENCY MODULATOR FOR MAGNETRON PULSES UTILIZING VARIABLY PHASE SHIFTED REFLECTION FROM MISMATCH TO PULL MAGNETRON FREQUENCY.
Navy-assigned Patent,
by Joseph H. Gamble and William C. Woods. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Magnetrous), (*Magnetrous, Radar reflections), (*Frequency modulation, Radar), Pulse modulation, Electromagnetic pulses, Radar pulses.

The frequency modulator for a radar system includes a magnetron for producing a pulse of high frequency energy and elements for reflecting a portion of the energy, passing a portion of the energy for use in transmission and phase shifting the reflected energy. A circulator isolates the magnetron.

Patent 3,149,327 Div. 8

MICROWAVE SUPERREGENERATIVE PULSE RADAR.
Navy-assigned Patent,
by Robert W. Bogie. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Microwave oscillators), (*Microwave oscillators, Reflex klystrons), (*Radar equipment, Microwave oscillators), Microwaves, Superregeneration, Electromagnetic pulses, Radar, Thyratrons.

The microwave system consists essentially of a reflex klystron oscillator operating in the microwave region and feeding into a waveguide which is operatively associated with the transmitting and receiving antenna and a diode in the waveguide from which the video output consisting of an envelop of the R-F energy is obtained. Since most available klystrons do not have a grid, a thyratron modulator is provided which is capable of plate pulsing of the klystron with adequate power on the order of 1,000 volts or more. Pulse forming lines are associated with the anode and cathode circuits of the thyratron to provide an initial pulse of large amplitude and a second pulse of smaller amplitude to modulate the reflex klystron oscillator. A trigger input to the thyratron controls the repetition rate of the system.

Patent 3,149,968 Div. 8, 20

APPARATUS FOR CORRECTING SENSITIVITY VARIATIONS IN PHOTOMULTIPLIER TUBES.
AEC-assigned Patent,
by Lloyd D. Stephens. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Photomultipliers), (*Photomultipliers, Sensitivity), Electron tubes, Light transmission, Photographic film, Optical filters, Nuclear physics.

Apparatus is provided for exposing a photographic film sheet to have a light transmission distribution inversely related to the light sensitivity distribution of a photomultiplier tube whereby the film may be used as a corrective filter in conjunction with the photomultiplier tube. The photomultiplier tube is used in nuclear research.

Patent 3,150,232 Div. 8

VARIABLE DAMPING CIRCUITS.
Army-assigned Patent,
by Edward R. Schmidt. 22 Sep 64 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Circuits), (*Circuits, Damping), Communication equipment, Band-pass filters, Signals.

The variable damping circuits are used in an electronic tone signal controlled switching center for a communication system. The circuit is utilized in conjunction with each narrow band-pass filter in the switching center. Each variable damping circuit is controlled to be conductive when there is no tone signal applied to the narrow band-pass filter to which it is connected. This causes any A.-C. signal remaining in the filter at the cessation of a signal to be shunted to ground by a low impedance path, and so to decay very rapidly. By this operation of the variable damping circuit each of the frequency detector circuits is immediately ready to accept a tone signal without the chance of false signal detection caused by hangover in the filters.

Patent 3,150,283 Div. 8

TRAVELING WAVE TUBE HAVING RECTANGULAR WAVEGUIDE SLOW WAVE STRUCTURE WITH EQUI-ANGULARLY SPACED ELECTRON GUNS.
Air Force-assigned Patent,
by Joseph E. Rowe.
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Traveling-wave tubes), (*Traveling-wave tubes, Design), Waveguides, Electron guns, Electromagnetic waves.

The radial dimension of the helical waveguide is made equal to the outer radius of the helix and the electron beam is displaced from the axis of the helix and allowed to pass through aligned apertures in the walls of the waveguide. This permits a greater interaction between the beam and the electromagnetic wave in the slow wave structure and results in increased amplification and power output.

Patent 3,150,325 Div. 8

WIDE BAND TRAVELING WAVE PARAMETRIC AMPLIFIER,
Navy-assigned Patent,
by Donald J. Blattner. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Parametric amplifiers), (*Parametric amplifiers, Traveling-wave tubes), Broadband, Electromagnetic pumps.

The wide band traveling wave parametric amplifier has an essentially dispersionless transmission line for electromagnetic propagation thereon of pump and input and idler waves in the same phase, whereby noise due to phase differences in the amplifier is reduced.

Patent 3,150,329 Div. 8

VARIABLE FREQUENCY MAGNETIC MULTIVIBRATOR.
NASA-assigned Patent,
by Stephen Paull. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Resonance oscillators), (*Resonance oscillators, Patents), Magnetic cores, Magnet coils, Circuits, Power supplies.

The multivibrator arrangement includes a plurality of high remanence cores, a source of power, a pair of conductive loops including windings linking each of the cores and coupled across the source, switches in each of the loops and circuits, including windings, linking each of the cores for effecting reliable operation of the switches, a control winding linking all but one of the cores and a circuit for applying a variable signal to the control winding.

Patent 3,150,370 Div. 8, 12

RADAR SEQUENCER.
Navy-assigned Patent,
by Anton J. Lisicky. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar equipment), (*Radar equipment, Switching circuits), Sequence switches, Circuits, Relaxation oscillators, Gates (Circuit), Radar pulses, Radar signals, Guidance, Guided missiles.

The device is useful in missile ranging where beacon stealing is a problem. The sequencer circuit includes a plurality of bistable multivibrators, 'and', and 'or' gates in combination with a sequence counter to produce a proper delay in the synchronous pulses for each radar in the chain to cause the radar transmitted pulses of the radars in the chain to arrive at the missile in the desired spaced intervals of time. Repetition triggers or transmitted pulses must be available from each radar, and clock pulses or constant frequency pulses must be generated and available to the sequencer circuit.

Patent 3,152,938 Div. 8

METHOD OF MAKING PRINTED CIRCUITS.
Army-assigned Patent,
by Nicholas Osifchin and Edgar E. Wright.
13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Printed circuits), (*Printed circuits, Patents), Manufacturing methods, Rotary switches, Commutators.

The method is useful in making switch plates used in high-speed rotary switches or commutators in electronic computers, data processing systems, or telephone step-by-step mechanisms. A printed circuit is provided which has the surface of its electrically conductive circuit pattern precisely flush with the surface of its insulating base.

Patent 3,153,173 Div. 8, 7

VOLTAGE SAMPLING, AMPLIFYING, AND COMBINING CATHODE RAY TUBE SYSTEM.
Navy-assigned Patent,
by Clarence J. Carter. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cathode ray tubes), (*Voltage

amplifiers, Cathode ray tubes), (*Cathode ray tubes, Voltage amplifiers), Signals, Voltage, Samplers, Electronic switches, Electron beams.

The system sequentially or selectively samples a large number of very low voltage input signals at a high rate of sampling, amplifying and combining the signals on a single channel. The system makes use of a beam switching tube.

Patent 3,153,176 Div. 8, 22

RESONANT REED RELAY CIRCUIT WITH LONG ACTIVATION TIME DELAY.
Air Force-assigned Patent,
by Wallace C. Clay. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Time-delay relays), (*Time-delay relays, Circuits), Timing circuits, Delay circuits, Resonators, Capacitors, Resistors.

A resonant reed relay has a long activation time delay. This is accomplished through controlling the output relay of the circuit by means of a long time constant R-C circuit the capacitor of which is normally held in a state of low charge by a shunt resistance. The resonant reed relay is then used to actuate a switch, which may be a diode, to remove the shunt resistor and allow the capacitor to charge slowly to the point where the output relay is actuated. Cessation of the audio tone restores the shunt and rapidly discharges the capacitor of the long time constant circuit.

Patent 3,153,201 Div. 8, 20

OSCILLATOR-LIMITER-DETECTOR APPARATUS AND METHOD.
Navy-assigned Patent,
by Walter D. Knight. 13 Oct 64
Unclassified pater

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Oscillators), (*Oscillators, Nuclear resonance), (*Nuclear resonance, Oscillators) Limiters, Monitors, Electron tubes.

The oscillator is adapted for use in studies of nuclear resonance. The circuit includes a pair of multielectrode electron tube sections and other components, including resistors and capacitors.

Patent 3,153,694 Div. 8, 14, 26

ENCAPSULATION OF ELECTRONIC CIRCUITS.
Army-assigned Patent,
by Joseph R. Tomlinson. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D. C., 20231, $0.25

Descriptors: (*Patents, Packaged circuits), (*Packaged circuits, Encapsulation), Isocyanate plastics, Expaned plastics, Containers.

The electronic circuit is placed in an open top container and a predetermined amount of a foam-in-place polyurethane resin formulation of closed pore, rigid type is dispensed around the electronic circuit.

Patent 3,153,733 Div. 8

SEQUENTIAL KEYER.
Navy-assigned Patent,
by Frank C. De Bolt and Richard A. Hills.
20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse generators), (*Pulse generators, Sound signals), Electronic equipment, Switching circuits.

The system is for sequentially keying audio signals. In conventional keyers, a motor-driven rotary switch is employed to alternately switch signals. This electronic sequential keyer has no moving parts. It has an adjustable keying rate that is adjustable over a wide range.

Patent 3,153,762 Div. 8, 22

PULSE INSERTION CIRCUIT FOR DETECTING MISSING PULSES AND FOR INSERTING LOCALLY GENERATED, SYNCHRONIZED PULSES THEREFOR.
Army-assigned Patent,
by Alan B. Johnson. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electromagnetic pulses), (*Electromagnetic pulses, Monitors), Loaders, Pulse generators, Circuits, Oscillators, Relaxation oscillators, Gates (Circuits), Pulse amplifiers.

The system functions to substitute a synthesized pulse for a pulse which has been dropped out or omitted from a series of constant repetition rate pulses designed to effectuate operation of a load device. The system components include a pulse input, a blocking oscillator, two multivibrators, or flipflops, a pair of amplifiers, an AND gate, a pulse generator and an output.

Patent 3,153,765 Div. 8

DIRECT COUPLED COAXIAL LINE AMPLIFIER.
Navy-assigned Patent,
by Tommy S. Weaver. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Amplifiers), (*Amplifiers, Coaxial cables), Electrical impedance, Coupling circuits, Direct current, Radiofrequency power, Transmission lines.

Low impedance coaxial lines are used as the center conductors of a coaxial amplifier to allow direct coupling to the input and output lines. Elements are provided for direct coupling into an amplifier and for separating D.C. and R.F. energy.

Patent 3,153,768 Div. 8

MINIATURIZED TEM MICROWAVE BANDPASS FILTER.
Navy-assigned Patent,
by Elwin W. Seeley and John R. Alday. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,

Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Band-pass filters), (*Band-pass filters, Microwave equipment), Electromagnetic waves, Waveguides, Transmission lines.

The microwave filter is for use with rectangular, square or elliptical coaxial waveguides. The filter consists basically of inductive stubs placed in tandem along a length of transmission line.

PB-166 417 Div. 8
OTS Prices: HC $1.00/MF $0.50

Electronics Research Labs., Columbia Univ., New York.
ON THE RESPONSE AND APPROXIMATION OF GAUSSIAN FILTERS,
by J. Klapper and C. M. Harris. 13 Feb 59,8p
Unclassified report

Pub. in IRE Transactions on Audio, 1959, v. AU-7, May-Jun 59.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Band-pass filters, Communication theory), (*Low-pass filters, Communication theory), Amplitude modulation, Phase modulation, Transients, Coupling circuits, Attenuation.

The Gaussian filter has excellent transient characteristics as evidenced by its response to a variable frequency signal. It also has a linear phase response and a reasonably sharp amplitude response cutoff, and it is relatively easily approximated, as evidenced by that fact that 5 interstage coupling networks result in a close approximation down to about 45 db.

9. Fluid Mechanics

AD-289 232 Div. 9, 12
OTS Prices: HC $3.00/None

AVCO-Everett Research Lab., Everett, Mass.
THE UNSTEADY HYPERSONIC WAKE BEHIND SPHERES,
by J. A. Fay and A. Goldburg. Nov 62, 54p
Avco-RR-139
Contracts AF04 694 33 and DA19 020ORD5476
BSD TDR62 105
Unclassified report

Descriptors: (*Spheres, Wake), (*Wake, Hypersonic flow), Blunt bodies, Luminescence, Reentry vehicles, Atmosphere entry, Vortices, Schlieren photography, Incompressible flow, Reynolds number, Turbulence, Air, Argon, Xenon.

Optical observation of self-luminous wakes behind spheres suggests that vortex loops are generated behind a blunt hypervelocity body and are shed at regular intervals in a manner similar to that which is observed in incompressible flow. Transition phenomena for the hypersonic wake are examined in the light of this vortex shedding hypothesis. A quantitative correlation of transition Reynolds number and Strouhal number is presented for luminous wakes behind spheres in air, argon and xenon at Mach 15 to 25. In the transition regime, it is suggested that the schlieren photographs of Slattery and Clay show rough eddy-like structure downstream of the body when the large discrete vortex loops break down and decay into the smaller eddies which produce sufficient sharpness of density gradient for schlieren observation. The determination of the appropriate Reynolds number for transition to vortex shedding and to turbulence in wakes behind hypervelocity spheres in pressurized ranges depends strongly on the real gas behavior of the flow. The possible mechanisms for transition to vortex shedding and the subsequent decay into small-scale turbulence are examined in the light of measurements of luminous wake growth for Mach numbers between 15 and 25.

AD-449 437 Div. 9, 1
OTS Prices: HC $2.00/None

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS: PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Louis G. Kaufman, II. Aug 64, 39p
Contract AF33 616 8130, Proj. 8219, Task 821902
FDL TDR64 120
Unclassified report

Descriptors: (*Heat transfer, Blunt bodies), (*Aerodynamic configurations, Hypersonic flow), Pressure, Delta-wings, Swept-back wings, Trailing control surfaces, Flaps, Fins, Aerodynamic loading, Angle of attack, Reentry vehicles.

Pressure and heat transfer data were obtained for Mach 21 flows over a blunt pyramidal configuration composed of a 70 degree sweepback delta wing surface and two dihedral surfaces. Instrumented trailing edge flaps were mounted in pairs on either the delta wing or dihedral surfaces and an uninstrumented ventral fin was attached during several test runs. The model was pitched at angles of attack between -30 and +45 degrees for free stream Reynolds numbers, based on model length, of approximately 51,000. (Author)

10. Fuels and Combustion

Patent 3,150,932 Div. 10, 4

APPARATUS FOR OXYGEN-FILLED CLOSED FLASK COMBUSTION.
Agriculture-assigned Patent,
by Clyde L. Ogg. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Combustion), (*Combustion, Remote-control systems), Oxygen, Laboratory equipment, Oxidation, Chemical analysis, Ignition, Light, Absorption (Physical), Containers.

The container for the oxygen may be an Erlenmeyer flask. Combustible materials are oxidized as one of the steps in a chemical analysis procedure. The sample is ignited by remote control using a lamp which focuses rays on a combustible light absorbing fuse.

11. Ground Transportation Equipment

No Entries

12. Guided Missiles

AD-401 703 Div. 12
OTS Prices: HC $2.00

RAND Corp., Santa Monica, Calif.
THE PROBABILITY DISTRIBUTION OF ANTI-MISSILE MISS DISTANCE DUE TO OBSERVATION AND GUIDANCE NOISE,
by W. B. Kendall. Feb 63, 33p RM-3505-ARPA
Contract SD-79, ARPA Order 189 61
Unclassified report

Descriptors: (*Guided missile tracking systems, Errors), (*Noise (Radio), Guided missile tracking systems), (*Interception probabilities, Antimissile defense systems), Statistical functions, Tracking, Guided missile countermeasures, Matrix algebra, Equations, Guided missile detection, Kill probabilities, Terminal ballistics, Circular error probable.

In this Memorandum the problem of intercepting an attacking ballistic missile (BM) with an anti-missile missile (AMM) when Gaussian noise corrupts both the observations of the BM and the guidance system of the AMM is considered. It is assumed that the position of the BM at some future time is estimated from a set of (possibly correlated) measurements (of any type) made on it, and that the error in this position estimate is related to the errors in the measurements by the usual linear relation. It is assumed that the noise in the AMM guidance system is such that the uncertainty in the position of the AMM at intercept has a general three-dimensional Gaussian distribution. For these general assumptions the probability that the miss distance between the AMM and the BM will be less than any given amount is determined and shown in several curves. The cumulative distribution function for the generalized chi-squared distribution in any number of dimensions is obtained. For the more special case of uncorrelated measurements and AMM position uncertainty with spherical symmetry are obtained which indicate how sensitive the miss distance is to incremental changes in the accuracies of any of the measurements.

Patent 3,148,586 Div. 12, 31

ADJUSTABLE MISSILE SNUBBER.
Navy-assigned Patent,
by Thomas C. Boyle. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missile launchers), (*Guided missiles, Handling).

The modified upper snubber mechanism is an improvement over the snubber mechanism disclosed in patent No. 3,106,132. It is used within a shipboard launcher cell which may be elevated and trained in azimuth, like a deck gun. The structure of the snubber mechanism is such that it engages missiles of different diameters and is adjustable to different fixed positions for the particular diameter missile which is to be launched.

Patent 3,149,569 Div. 12

MISSILE INSTRUMENTATION PROTECTION MEANS.
Army-assigned Patent,
by Robert S. Chamberlin. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vibration isolators), (*Vibration isolators, Guided missile components), Impace shock, Instrumentation, Recovery, Acceleration.

The impact protection device is utilized in a missile designed for high acceleration and provided with instruments for recovery after impact. The instrumentation housing is mounted in the forward position of a missile. The mounting for the housing applies a pull rather than a push to the housing during acceleration of the missile.

Patent 3,150,387 Div. 12, 14

FOAM GENERATOR.
NASA-assigned Patent,
by George F. Look and Frank M. Ballentine, Jr.
29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Foams), (*Foams, Production), (*Reentry vehicles, Landing gear), Inflatable structures, Instrument landings, Buoyancy, Spacecraft, Payload.

The foam generator is connected with an inflatable elastomeric bag or envelope forming part of the payload of a space vehicle designed to land in a body of water. A pair of sealed containers contain a foam producing resin and a catalyst, respectively. The seal on the containers are ruptured by a fuse in response to a signal and foam fills the envelope to provide buoyancy for an attached instrument package.

Patent 3,150,560 Div. 12

AUTOMATIC OPENING DEVICE.
Air force-assigned Patent,
by Sidney Rosenthal. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Release mechanisms), (*Satellites (Artificial), Release mechanisms), Automatic, Containers, Explosive actuators.

The opening device is attached to a container associated with a satellite and is designed to open at a certain altitude. The device includes squib charges, plungers attached to a base and an opener lever associated with the plungers.

Patent 3,150,848 Div. 12, 1

METHOD OF DECOYING A MISSILE FROM ITS INTENDED TARGET.
Navy-assigned Patent,
by Samuel E. Lager. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Decoys), (*Decoys, Guided missiles), Aircraft, Nuclear particles, Energy, Targets.

An aircraft being pursued by a missile evades the missile by emitting a series of energy-radiating masses as decoys. The masses are in the form of an aerogel and ignite spontaneously to create spurious sources of radiation.

Patent 3,152,545 Div. 12, 22

MID-FIN.
Navy-assigned Patent,
by James H. Potts, Jr. 13 Oct 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fin-stabilized ammunition), (*Fins, Guided missiles), Air-to-surface, Guided missiles, Parachutes, Stabilizers.

The missile may be dropped from an aircraft. The missile has a mid-fin stabilizer and an end stabilizer which initially stabilizes the load after release from an aircraft. The tail section is ejected to allow deployment of a parachute. The mid-fin stabilizes the load during the change from free flight to parachute sustained fall.

Patent 3,152,774 Div. 12, 7, 30

SATELLITE TEMPERATURE STABILIZATION SYSTEM.
Navy-assigned Patent,
by Theodore Wyatt. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Temperature control), (*Temperature control, Solar cells), (*Satellites (Artificial), Temperature control), Power supplies, Temperature, Stabilization systems, Electrochemistry.

The system is for the control of the solar cell paddles of an orbiting space satellite. The paddles are constructed of sufficient metal only for structural purposes, and the desired thermal capacity is obtained by use of a fluid coolant material such as water, methyl chloride, or one of the Freons. The thermal capacity is supplied by the specific heat of the fluid, by the heat of fusion or by the heat of vaporization.

Patent 3,153,367 Div. 12

ANTI-MISSILE SYSTEM.
Army-assigned Patent,
by Frederick W. Ross and Morris Kaswen. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Anti-missile defense systems), (*Anti-missile defense systems, Patents), (*Anti-satellite defense systems, Patents), Guided missiles (Surface-to-surface), Nuclear warheads, Weapon systems.

The terminal stage sub-system is for use in an anti-ballistic missile weapon system. The system includes apparatus to place a gun in close proximity to an ICBM or a satellite at high altitude, to stabilize the gun in relation to the missile, and to fire the gun so as to destroy the missile with the explosive charge or war head projected from the gun. The terminal sub-system includes equipment to air and project the charge, which may be an atomic shell.

Patent 3,153,757 Div. 12, 22

SAFE METHOD FOR TESTING THE ELECTRICALLY CONDUCTIVE FIRING ELEMENT OF AN EXPLOSIVE DEVICE BY ROTATING AND COUNTERROTATING A PORTABLE GALVANOMETER.
Air Force-assigned Patent,
by Marquis W. Bolton. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Firing mechanisms (Ammunition)), (*Explosives initiators, Tests), Galvanometers, Rocket igniters, Rocket motors, Guided missiles, Portable, Electrical conductance, Circuits.

The method is for testing squibs and the like in bolts, spin rockets and igniters for rocket motors before the launching of a missile. The method consists in connecting the explosive device to be tested across the terminals of a sensitive portable galvanometer, alternately rotating and counterrotating the galvanometer about the axis of rotation of the galvanometer needle and observing the amplitude of the needle oscillation about its zero point. If the explosive device is defective, that is, does not have electrical continuity, its presence in the galvanometer circuit has no damping effect on the needle oscillations and they are therefore of large amplitude.

PB-166 523 Div. 12
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE ORBITAL SHADOW TIME OF AN EARTH SATELLITE.
Master's thesis,
by George William Peckham. Sep 60, 69p
AFIT GAE/AE-60-9; AD 250 793
Unclassified report

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Time), Earth, Optical images, Motion, Matrix algebra, Simultaneous equations, Geometry, Transformations (Mathematics), Sun.

The fraction of a periodical revolution that an earth satellite spends within the earth's shadow is a function of the relative orientations of the instantaneous orbital plane, the apsidal line, and the sun. For any given time of investigation at which the orbital elements are known, the points where the satellite orbit penetrates the shadow cone can be found by the simultaneous solution of two second-degree, algebraic equations. Kepler's time equation for an ellipse is convenient for calculating the time between penetration points. The shadow time of Sputnik II is calculated from November 6, 1957 until its final revolution. (Author)

13. Installations and Construction

AD-428 817 Div. 13, 1
OTS Prices: HC $4.00/None

ARING Research Corp., Washington, D.C.
MAINTAINABILITY PREDICTION: THEORETICAL BASIS AND PRACTICAL APPROACH.
Revised ed.,
by George Harrison, Harold Leuba, and Eli Schneider.
31 Dec 63, 134p ARINC-267-02-6-420, Rev. of ARINC-207-1-275
Contract AF33 657 10594
Unclassified report

Descriptors: (*Maintainability, Mathematical prediction), (*Aircraft equipment, Maintenance), (*Electronic equipment, Airborne), Probability, Performance (Engineering), Programming (Computers), Specifications, Effectiveness, Equations, Theory.

Methods for procuring maximum value from airborne electronic equipment were studied. The theory behind the maintainability prediction technique is summarized, and several refinements are introduced in the report.

The most significant of these is the prediction of initial delay. The introduction of this latter technique permits predictions of the distribution of total system down time due to malfunctioning equipment. It uses measurable aspects of the equipment to predict the probability of occurence of certain Elemental Activities. The probabilities and the observed times required for their performance are combined, according to a series of combinational relationships, to produce larger and larger categories of maintenance time and, finally, a distribution of total system down time. The technique, developed for airborne electronics equipment, is applicable primarily to equipments and systems used under the Air Force general maintenance policy and only at the flight-line level. However, the research approach and the basic relationships developed should provide for a degree of general application. Sample predictions are made for several systems, and the results of some of these verification studies are included. (Author)

AD-440 274 Div. 13, 2, 7, 12
OTS Prices: HC $3.00/None

General Electric Co., Syracuse, N. Y.
LIGHTNING PHENOMENA INVESTIGATION.
Final rept. for 6 Jun 62-15 Aug 63,
Mar 64, 100p
Contract AF29 601 5402, Proj. 8809
WL TDR64 21

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-437 816.

Descriptors: (*Launching sites, Lightning), (*Lightning, Electrical properties), Electric discharges, Transients, Voltage, Electric currents, Electric cables, Guided missiles, Damage, Lightning arresters, Storms, Meteorological parameters.

The lightning-phenomena investigation program was designed to determine induced voltage and currents in certain selected missile-site cables as a result of a lightning discharge on or near the instrumented SM-78 site. The characteristics of the lightning discharge, which produced the induced signals, were measured; in addition, background meteorological measurements were made to facilitate the analysis of the storm event and the resulting data. Limited oscillographic surge data are presented on the only three storms which occurred in the vicinity of the instrumented site. Data are also presented on the 6-month continuous monitoring period on the meteorological parameters, point discharge current, and the atmospheric electric gradient. The extent or type of damage to the SM-78 system that would result from a direct or near lightning strike cannot be concluded from the limited data presented for the three storms, since the only lightning discharges during the instrumentation period occurred several miles from the instrumented site.

Patent 3,148,908 Div. 13

TOWING AND LIFTING YOKE.
Army-assigned Patent,
by Donald F. Smith. 15 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Handling), (*Cylindrical bodies, Handling), Containers, Helicopters, Towing vehicles, Hoists.

The towing and/or lifting yokes are for lifting cylindrical articles such as drums, barrels and the like. The device can either lift or tow a container of the type disclosed in patent No. 2,978,004. The container can be lifted by a helicopter or towed by a vehicle. The yoke is constructed so that it can be knocked down into sub-assemblies for storage or transportation.

Patent 3,150,670 Div. 13

QUICKLY STRIKABLE AIR SUPPORTED BUILDING STRUCTURE.
Army-assigned Patent,
by Walter W. Bird, George F. Reitmeier, and Anson T. Baschmann. 29 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Inflatable structures, Buildings), (*Buildings, Inflatable structures), Air, Fastenings.

The air-erected and supported building structure is made up of a plurality of sections connected together by separable fasteners of the quick release type. The structure may be struck by separating the sections along the ridge line.

PB-166 339 Div. 13
OTS Prices: HC $3.00/MF $0.75

Defense Atomic Support Agency, Washington, D. C.
DYNAMIC ANALYSIS OF A ONE STORY RIGID FRAME,
by R. C. DeHart. 29 Sep 55, 54p
DASA 605; AD 209 282L

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Structures, Mathematical analysis), Loading (Mechanics), Load distribution, Statics, Dynamics, Time, Plasticity, Deflection, Equations, Motion, Theory.

A rigid frame subjected to time dependent forces is treated. The theoretical study consists of the use of the Lagrange equation of motion which makes possible the determination of time dependent mode shape equations. Expressions for time dependent moment are obtained from the mode shape equations. Dynamic deflection at the time plastic action begins is determined and this is compared with the static deflection required for plastic action to begin. Comparison of these results indicates that the deflection corresponding to incipient plasticity under true dynamic conditions can be much less than the deflection corresponding to incipient plasticity as determined by static load tests. (Author)

PB-166 443 Div. 13, 10, 26, 33
OTS Prices: HC $3.00/MF $0.75

Bechtel Corp., San Francisco, Calif.
THE ECONOMICS OF RESIDUAL FUEL OIL DESULFURIZATION.
Summary rept.
Jun 64, 89p

Unclassified report

Under contract to the Public Health Service.

Descriptors: (*Fuel oil, Waste gases), (*Air pollution, Fuel oil), (*Refineries, Economics), Petroleum, Sulfur, Separation, Processing, Costs, Mathematical models, Linear programming.

No. 6 Residual Fuel Oils marketed in the United States contain an average sulfur content of about 1.6 percent,

with a range encompassing a minimum of about 0.4 percent to a maximum of about 4.5 percent. The emission of sulfur dioxide from furnaces burning such fuel is recognized as a cause of significant air pollution. The objective of the study is to establish costs for reducing the sulfur content of fuel oils manufactured from high sulfur crudes. The desired maximum sulfur content for an acceptable fuel oil has been taken to be 0.5 wt. percent for this study. Presented are eight case studies developed in detail with the aid of a Linear Programming model of a typical 100,000 barrel per day modern refinery. (Author)

PB-166 518 Div. 13
OTS Prices: HC $3.00/MF $0.75

Sea Water Conversion Lab., Univ. of California, Richmond.
THE OPTIMUM TEMPERATURE FOR THE OPERATION OF A NON-SCALING MULTI-STAGE FLASH EVAPORATOR PLANT.
Water Resources Center contribution no. 64,
by Lester H. MacLeod, Abraham Gendel, and Ahmed F. El Sahrigi. Jan 63, 51p SWCL-63-1

Unclassified report

Descriptors: (*Sea water, Desalination), (*Desalination, Distilling plants), (*Distilling plants, Optimization), Water supplies, Evaporators, Heat exchangers, Surface area, Pumps, Power, Heaters, Costs, Equations, Temperature, Thermodynamics, Economics.

The multi-stage flash distillation plant presently offers one of the most economical means of converting sea water to fresh water and was, therefore, been chosen as the subject of an optimization study. Equations were established which allow the determination of the cost of heat, pumping power, and heat exchanger surface per unit of product. Evaluation of these equations, in the absence of experimental sea water data much beyond 212F, required some extrapolation of sea water properties, using well established thermodynamic relationships. Based on this data, and the assumption of a non-scaling system, it is concluded that the optimum temperature of the feed stream leaving the heater lies between 350 and 400F and that, by operating with this optimum temperature, it is possible to reduce the cost per thousand gallons of product by $0.10 to $0.15 below the cost for a plant with a corresponding temperature of 210F. (Author)

14. Materials (Non-Metallic)

AD-278 633 Div. 14
OTS Prices: HC $7.20/None

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
THERMODYNAMICS OF CERTAIN REFRACTORY COMPOUNDS. VOLUME I. LITERATURE SEARCH, COMPUTATIONS, AND PRELIMINARY STUDIES.
Final rept. for 1 May 60-30 Apr 61,
by S. L. Bender, R. E. Dreikorn, T. H. Einwohner, R. C. Feber, and R. E. Cannon. May 62, 419p
Contract AF33 616 7327, Projs. 7350, 7381, Task 73500, 73812
ASD TR61 260 P1 V1

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Refractory materials, Thermodynamics), (*High-temperature research, Refractory materials), (*Ceramic materials, Thermodynamics), Oxides, Borides, Carbides, Nitrides, Gases, Metals, Carbon, Nitrogen, Oxygen, Refractory metals, Alkaline earth metals, Transition elements, Boron, Heat of formation, Preparation, Stability, Tables, Experimental data.

The thermodynamics of certain refractory compounds from 298.15 to 6000 K were studied. The oxides, borides, carbides, and nitrides of the metals in groups IVB, VB, VIB, and VIIB of the periodic chart in addition to those of silicon, scandium, beryllium, magnesium, calcium, strontium, and osmium were included. Tables of ideal gas thermodynamic functions were prepared. Reviews and analyses of data were completed on the oxide systems of Be, Ca, Cr, Mg, Mo, Sr, Ti, and W, the borides of Ti, and the monocarbide of Ti. (Author)

AD-414 972 Div. 14
OTS Prices: HC $4.00

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
MATERIALS REVIEW (13th).
Rept. for 2 Jul 62-5 Jan 63,
by Arthur Lyem. Jun 63, 108p
Proj. 4C93 30 001
CRDL SP5 2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-295 430.

Descriptors: (*Materials, Reviews), (*Polymers, Reviews), Plastics, Polymerization, Manufacturing methods, Radiation damage, Medical equipment, Fibers (Synthetic), Processing, Textiles, Organic materials, Inorganic compounds, Metals, Alloys, Bibliographies.

The purpose of the periodic review is to present technical and scientific highlights regarding materials research in the US and abroad. Provided is information concerning recent technological advances, which are presented under five major headings: High polymers, plastic materials, synthetic fibers, miscellaneous organic and inorganic compounds, and metals and alloys. Over 320 articles are abstracted from various publications. Materials and technological aspects are discussed, and a complete bibliography is given. (Author)

AD-426 490 Div. 14, 12
OTS Prices: HC $2.00/None

Aerojet-General Corp., Sacramento, Calif.
RESEARCH AND DEVELOPMENT IN SUPPORT OF THE POLARIS PROGRAM. TASK VI. DEVELOPMENT OF IMPROVED RESIN SYSTEMS FOR FILAMENT-WOUND STRUCTURES.
Bimonthly progress rept. no. 3, 1 Oct-8 Nov 63.
19 Dec 63, 36p AGC-0627-VI-3
Contract NOw63 0627c
N64 14097

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Epoxy plastics, Aging (Materials)), Ethylenediamine, Organic nitrogen compounds, Amines, Binders, Castings, Tensile properties, Hardness, Transition temperature, Impact shock, Density, Shear stresses, Loading (Mechanics), Plasticizers, Experimental data, Statistical analysis, Guided missiles (Underwater-to-surface), Guided missiles(Surface-to-surface), Navy.

This third bimonthly progress report presents the final

results of analyses of raw materials (amine and anhydride curing agents, epoxy resins), physical and mechanical property data collected thus far on resin systems cured with m-phenylenediamine, ethylenediamine, and 4,4'-methylenedianiline, and the statistical analysis of the data for the m-phenylenediamine-cured systems.

AD-429 071 Div. 14, 17, 32
OTS Prices: HC $3.00

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
MATERIALS REVIEW (14TH).
Rept. for Jan-Jul 63,
by Arthur Lyem. Dec 63, 98p
Proj. 1C522301A075, formerly 4C93 30 001
CRDL SP5 3
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Materials, Reviews), (*Plastics, Reviews), (*Reviews, Materials), (*Polymers, Reviews), Silicone plastics, Isocyanate plastics, Polyethylene plastics, Styrene plastics, Acrylic resins, Thermoplastics, Adhesives, Laminated plastics, Phenolic plastics, Cellulosic plastics, Synthetic rubber, Radiation chemistry, Radiation damage, Radiation effects, Fibers (Synthetic), Lasers, Refractory, materials, Metals, Alloys, Manufacturing methods.

The purpose of this periodic review is to present technical and scientific highlights regarding materials research here and abroad. Provided is information concerning recent technological advances, which are presented under five major headings: High polymers, plastic materials, synthetic fibers, miscellaneous organic and inorganic compounds, and metals and alloys. Over 300 articles have been abstracted from various publications and languages. Materials and technological aspects are discussed, and a complete bibliography is given. (Author)

AD-440 273 Div. 14, 31
OTS Prices: HC $4.00

Thompson (H. I.) Fiber Glass Co., Gardena, Calif.
INVESTIGATION OF STRUCTURAL PROBLEMS WITH FILAMENT WOUND DEEP SUBMERSIBLES.
Final rept. for 17 Jan 63-16 Jan 64,
by N. C. Myers, G. D. Lee, F. C. Wright, and J. V. Daines. Jan 64, 120p
Contract NObs88351, Projs. SF013 05 03, 231'62, Task 1025
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), Pressure vessels, Cylindrical bodies, Stiffened cylinders, Hemispherical shells, Model tests, Hydrostatic pressure, Fatigue (Mechanics), Joints, Tapes, Structures, Mathematical analysis, Stresses, Measurement, Plastics, Reinforcing materials, Glass textiles, Epoxy plastics, Structural properties, Theory, Test methods.

This program investigated some of the structural problems originating in the application of the filament-wound composite to the hulls of deep-diving vehicles. Small scale models were designed, fabricated and tested under static and cyclic external pressure. A design collapse pressure of 13,333 psi, and 10,000 cycles to one-half of this pressure were program objectives. Problems of major concern were closures, closure attachment, closure and cylinder penetrations, transverse cylinder joints, and positive frame attachments.

OTR-109 Div. 14, 17
OTS Price: $0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
GREASE LUBRICATION.
Dec 64, 21p
Unclassified report

Descriptors: (*Lubrication, Greases), (*Greases, Lubrication), (*Bibliographies, Lubrication), Lubricants, Lubricant additives, Antiseize compounds, Antioxidants, Corrosion inhibition, Structural parts, Steel, Friction, Loading (Mechanics), Vibration, Surfaces, Life expectancy, Heat-resistant materials, Reviews, Abstracting.

Significant reports covering the period since 1962 were selected for this study, with reference to relevant earlier works. A series of reports for the U. S. Army prepared at its Rock Island Arsenal, together with other Government R and D, should provide useful information to manufacturers seeking to increase the life of steel parts exposed to sliding, rubbing, and rolling friction, together with heavy loadings and vibrations. The reports deal with either different or similar steel surfaces in contact with lubrication formulations, additives to reduce corrosion, and variations in method and degree of loading and vibration. Additives for high temperature greases are possible with imide-type thickeners. One aluminum imide thickener tested has a melting point of over 1000F. Several bibliographies and conferences cover grease R and D under government sponsorship. While much of this relates to aerospace, various civilian applications should suggest themselves. (Author)

Patent 3,149,906 Div. 14

PROCESS FOR TREATING ANIMAL FIBERS WITH OZONE.
Agriculture-assigned Patent,
by Walter J. Thorsen. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Processing), (*Fibers (Natural), Processing), Woolen textiles, Animals, Ozone.

The properties of wool and mohair, such as shrinkage resistance, are improved by the process. A mass of animal fibers is treated with a composite steam-ozone stream which is blown through the mass for from 1 to 10 minutes.

Patent 3,150,281 Div. 14

GLASS OF HIGH ULTRAVIOLET TRANSMITTANCE, METHOD, AND ARTICLES MANUFACTURED THEREFROM.
AEC-assigned Patent,
by Adli M. Bishay. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Glass), (*Glass, Ultraviolet radiation), Mixtures, Boron compounds, Oxides, Aluminum compounds, Potassium compounds, Mercury lamps.

The glass composition consists essentially of a mixture

of B2O3, AL2O3 and K2O. It may be used in a germicidal lamp in the form of an elongated cylindrical envelope with terminals, ballasts, electrodes and mercury vapor throughout the interior of the envelope.

Patent 3,150,920 Div. 14, 4

PARTIAL ETHERS OF CELLULOSE AND d,l-BUTADIENE DIOXIDE.
Agriculture-assigned Patent,
by Ralph J. Berni, John B. McKelvey, and Ruth R. Benerito. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Textiles), (*Textiles, Processing), (*Cellulose, Ethers), Dioxides, Fibers (Natural), Cotton textiles.

The fabrics have improved wet and dry crease recovery. Cellulose materials made from cotton, flax, ramie and the like may be treated. The material is padded with sodium hydroxide and immersed in a 20 percent solution of d,l-butadiene dioxide in carbon tetrachloride for from 10 minutes to an hour. It is then washed and dried.

Patent 3,151,050 Div. 14

LAMINATED ANTI-CORROSIVE PAINT SYSTEM.
Army-assigned Patent,
by David K. Wilburn. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Corrosion inhibition), (*Paints, Corrosion inhibition), (*Corrosion inhibition, Paints), Carbon, Manganese compounds, Dioxides, Ammonium compounds, Chlorides, Organic materials, Solvents, Plastic coatings, Copper, Ceramic coatings, Laminates, Vehicles.

The paint system is for reducing atmospheric corrosion of vehicles in storage. The ferrous metal is coated with an electrolytic paint which is a suspension of carbon, manganese dioxide, ammonium chloride and an organic filler in a solvent. A second coating of a resin containing copper is applied and finally a top coat of paint or enamel.

Patent 3,153,597 Div. 14

POLYMERIC DIALDEHYDE-PROTEIN ADHESIVES AND WOOD LAMINATES THEREWITH.
Agriculture-assigned Patent,
by Francis B. Weakley and Charles L. Mehltretter.
20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Adhesives), (*Adhesives, Plywood), Laminates, Polymers, Aldehyes, Proteins, Borates, Sodium compounds, Aging (Materials).

The glue is a self-curing general purpose plywood glue. It is a room temperature reaction product of an aqueous borax-dispersion containing 100 parts of a protein and an aqueous borax-dispersion containing 2.5 to 5 parts, based on the dry weight of the protein, of dialdehyde starch.

Patent 3,153,598 Div. 14

PAPER SIZE FROM PINE OLEORESIN.
Agriculture-assigned Patent,
by Hugh B. Summers, Jr. and Glen W. Hedrick.
20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Paper), (*Paper, Additives), Organic materials, Preparation, Moistureproofing.

The paste sizes and dry sizes for paper are prepared from neutralized and partially neutralized pine oleoresin. The sizes are made directly from partially neutralized pine oleoresin, thus obviating the necessity for isolating and handling rosin as in the conventional preparation of sizes.

PB-166 512 Div. 14
OTS Prices: HC $4.00/MF $0.75

Picatinny Arsenal, Dover, N. J.
RESISTANCE OF PLASTICS TO OUTDOOR EXPOSURE,
by Kenneth T. Carolan and Joan M. Kuchkuda.
Nov 57, 102p
Projs. TB4 721A, 593 13 004
PA TR2102 Add. 1; AD 148 166
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plastics, Environmental tests), (*Aging (Materials), Plastics), Thermoplastics, Styrene plastics, Thermosetting plastics, Phenolic plastics, Polyester plastics, Cellulosic plastics, Laminated plastics, Physical properties, Tensile properties, Failure (Mechanics), Elasticity, Desert tests, Cold weather tests, Tropical tests.

The report is the first addendum to Picatinny Arsenal Technical Report 2102, by Robert B. Barrett, (PB-131 331), which described the results of an outdoor exposure program involving 76 commercially important plastics. Four sites selected to provide varied climatic conditions were used: Picatinny Arsenal, Fort Churchill, White Sands, and Panama. The program is being continued to provide for the testing of new materials. This first addendum deals with the following materials: Thermoplastics-Royalite 261 (a modified polystyrene), Plio-Tuf G-75-C (a styrene copolymer), DeJong glass-filled polystyrene; Thermosets-Durez 14475-Blk (a phenolic), Plaskon Alkyd 420, Laminac 4116 (a polyester), BRSQ 147 (a polyester), GE 12808 (a cotton flock filled rubber modified phenolic), GE 12809 (a fabric-filled rubber modified phenolic), GE 12478 (a wood-flour filled rubber modified phenolic), GE 12494 (an asbestos-filled rubber modified phenolic); Cellulosics-Tenite II (205A 20337 H2) (a cellulose acetate butyrate); Laminates-'AM'. (Author)

15. Mathematics

PB-166 516 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE ROOTS OF MARKOFFIAN RANDOM FUNCTIONS,
by A. J. F. Siegert. 5 Sep 50, 22p RM-447
ATI 210 657 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Statistical functions, Theory), Statistical processes, Probability, Integral transforms, Stochastic processes, Graphics.

PB-166 517 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MOMENT SPACES AND INEQUALITIES,
by Melvin Dresher. 7 Oct 52, 23p P-252
AD 224 252

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inequalities, Integrals), (*Integrals, Inequalities), (*Convex sets, Inequalities), Geometry, Boundary value problems, Real numbers, Statistical functions, Functions, Distribution theory.

The theory of generalized moment spaces is applied to integral inequalities. The well-known inequalities are derived and shown to be related to the same set of boundaries of the moment space. Several new inequalities are derived. (Author)

16. Medical Sciences

AD-273 280 Div. 16, 10, 30
OTS Prices: HC $2.00/None

Yale Univ., New Haven, Conn. School of Medicine.
IMPLANTATION AND USE OF BRAIN ELECTRODES FOR TOXICOLOGICAL APPLICATION.
Rept. for 16 Jan 60-15 Oct 61,
by Jose M. R. Delgado and Kenneth C. Back. Nov 61, 34p
Contract AF33 616 6899, Proj. 7163, Task 716305
ASD TR61 609; N62 10336

Unclassified report

Descriptors: (*Electroencephalography, Electrodes), (*Solid rocket fuels, Toxicity), (*Decaboranes, Toxicity), Medical research, Brain, Electrical properties, Thalamus, Cerebrum, Toxic tolerences, Lethal dosage, Monkeys, Behavior, Motor reactions, Histology.

A decaborane derivative, used as high-energy fuel and identified as HEF-3, was injected intraperitoneally in monkeys with electrodes permanently implanted in the brain. Administration of 1 mg/kg for a few days evoked a typical pattern of electrical activity characterized by high frequency, with high voltage bursts mainly localized in the hypothalamus without spread to limbic structures or other cerebral areas. Spread, however, was observed after long periods of burst activity. The electrical abnormality coincided with a typical set of symptoms: the animals were depressed, somnolent, with generalized twitching and short motor seizures. Recovery from electrical and clinical disturbance was complete if the total doses did not exceed 7 mg/kg in 9 days. Death of the animals was produced by a total dose of 6 mg/kg, given in 3 days. A selective effect of HEF-3 on the hypothalamus, or perhaps in motor structures located in its neighborhood, is suggested by our experiments. (Author)

Patent 3,148,989 Div. 16, 20

DECONTAMINATION OF MILK FROM RADIOACTIVE ANIONIC INGREDIENTS.
AEC-assigned Patent,
by Gopala K. Murthy, James, E. Gilcrist, and Jeptha E. Campbell, Jr. 15 Sep 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Milk), (*Milk, Decontamination), Radiological contamination, Ion exchange resins, Ion exchange, Iodine, Radioactive isotopes, Phosphates.

The process is for the anion exchange treatment of milk for the removal of I131. The process involves contacting an anion resin with a charging solution having the same pH value as that of the milk to be treated and having a chloride concentration about four times that of the milk, a concentration of inorganic phosphate about 4.6 times that of the milk and a citrate concentration about twenty times that of the milk, washing the resin thus charged with distilled water to remove any adhereing, nonadsorbed anions, contacting the resin with the milk to be treated, whereby the iodine is removed, and a milk product is obtained the chloride, phosphate and citrate concentrations of which are substantially unchanged.

PB-166 338 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
TEMPERATURE HISTORIES ASSOCIATED WITH THERMAL RADIATION BURNS TO HUMAN SKIN.
Final rept.,
by W. L. Derksen, T. I. Monahan, and G. P. deLhery.
15 Jan 60, 20p
NASL 5046 16 p8; DASA 1179

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermal radiation, Skin), (*Burns, Skin), Radiation effects, Temperatures, Humans, Rats, Swine.

The temperature histories associated with burns to human skin were determined from laboratory studies of thermal radiation burns. While the available data were not ideal it was desired to obtain the order of magnitude and characteristics of the temperatures involved for use in studying the phenomenology of thermal radiation burns and to provide a working criterion for the skin simulant. The data available consisted mainly of a series of radiant exposures to cause burns to animals under several test conditions and some measurements made directly on human skin. The thermal and optical constants for the skin involved - rat, pig, and human were available from sub-burn temperature measurements and were employed to compute the equivalent radiant exposures required to burn human skin. The temperature histories for the surface and at a depth of 0.05 cm were obtained by exposing a skin simulant to the equivalent radiant exposures calculated for human skin.

PB-166 421 Div. 16, 32
OTS Prices: HC $1.00/MF $0.50

National Library of Medicine, Washington, D. C.
NEW PROGRAM FOR INDEXING AT THE NATIONAL LIBRARY OF MEDICINE,
by Seymour I. Taine. Jan 60, 8p

Unclassified report

Pub. in Bull. MLA, 1961, v. 47, no. 2, p. 117-123.

Descriptors: (*Medical research, Indexes), (*Indexes, Medical research), (*Libraries, Medical research), Catalogs, Bibliographies, Periodicals, Reviews, Subject indexing, Punched cards, Automatic.

Starting in 1950 with the indexing of the total contents of about 1,225 journal titles, the coverage had risen to

more than 1,600 by 1959. From these journals there has come an annual indexing payload of some 105,00 to 110,000 items representing a broad cross section of the medical literature, well balanced from geographic, linguistic, and subject aspects. Shortly after the new Current List appeared, the practice of indexing technical reports of medical research projects was added. In terms of quantity of articles indexed, the Current List of Medical Literature has become the largest indexing service of the literature of a specialized subject anywhere in the world.

PB-166 427 Div. 16, 30
OTS Prices: HC $2.00/MF $0.50

Panoramic Research Inc., Palo Alto, Calif.
LETHALLY DEPENDENT GENES USING INSTANT SELECTION,
by W. W. Bledsoe. Dec 61, 30p PRI:1
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Genetics, Mutations), (*Mutations, Optimization), Numerical analysis, Iterative methods, Probability, Functions, Monte Carlo method, Sequences, Measure theory, Set theory, Bionics, Artificial intelligence.

This report is based on the use of biological concepts for an analytical study of systems (W. W. Bledsoe, PRI-2, Nov. 1961, p. 6-11), more specifically on an evolutionary method based on the principle of biological evolution. A mathematical analysis is made of the finite set f, a real-valued function of n binary variables, the analysis consisting largely of consideration of the evolutionary method of finding a maximizing point and estimating the rate of convergence under certain conditions on f. The purposes of the paper are to define the concept of s-lethal dependence and to determine (1) what the optimum mutation rate is when s > or = 2, and (2) the expected number of iterations required for convergence. Numerical evaluations were made by the use of the basic formulas evolved; in each case, the mutation rate was varied until a minimum was found for the expected number of iterations required for the convergence.

PB-166 452 Div. 16
OTS Prices: HC $1.00/MF $0.50

Birmingham Univ. (England).
A STUDY OF THE EFFECT OF SOME NEURALLY ACTIVE DRUGS ON INHIBITION IN THE AUDITORY PATHWAY,
by I. C. Whitfield and J. T. Allanson. 1958, 10p
Unclassified report

Pub. in Archives Itallennes de Biologie, 1958, v. 96, p. 29-37.

Descriptors: (*Auditory perception, Inhibition), (*Drugs, Auditory perception), (*Nervous system, Drugs), Hearing, Thresholds (Physiology), Sensory perception, Stimulation, Dosage, Convulsive disorders, Nerve cells.

The 'two-tone' method has been used to study the effects of fourteen diverse neurally-active drugs on inhibition in the auditory pathway. Using a partially inhibited response, it has been shown that the substances used neither increased nor decreased the inhibition under conditions which produce changes in other parts of the nervous system. The results confirm that the primary sensory pathway is less susceptible to drug action than the reticular pathway, and also demonstrate that the inhibitory process is different from that observed for motor neurones. (Author)

PB-166 461 Div. 16, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
AUTOMATED DATA PROCESSING FOR A MODERN HOSPITAL,
by Harold H. Wilson. 4 May 62, 14p SP-812
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Data processing systems, Hospitals), (*Hospitals, Data processing systems), Medical examination, Biochemistry, Hematology, Drugs, Medicine, Statistical data, Diagnosis, Records, Data storage systems, Display systems, Information retrieval, Automatic, Simulation.

This paper reports on the successful application of a automatic data processing fo the system of patient data of a large Veterans Administration General Medical and Surgical Hospital. These efforts have resulted in a model for simulating the operation of a hospital using real patient data which is cycled through the various pieces of equipment of a random access electronic digital computer. The major areas of ward centered hospital operations include data handling in response to information demands from such areas as biochemistry and hematology laboratory tests, medications, collection of vital signs, patient statistics and bed census.

PB-166 466 Div. 16, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
DEVELOPMENT OF A SIMULATED WARD OPERATION.
Rept. for Jan 61-Mar 62,
by John A. Vallance. 24 May 62, 14p SP-838
Unclassified report

Presented at the Medical Data Workshop, Sponsored by IBM, Inc., Houston, Texas, 4-6 Jun 62.

Descriptors: (*Hospitals, Data processing systems), (*Models (Simulations), Hospitals, Medical research, Automation, Medical examination, Medicine, Statistical data, Punched cards, Data storage systems, Diagnosis, Simulation.

From its inception in January 1961 to successful maturation in March 1962, the author traces the development of a simulated ward operation by the combined efforts of the System Development Corporation and the Veterans Administration System Research Development and Training Center, in Santa Monica. The author's exposition is essentially an account of how an analysis team of SDC and VA MEDIC personnel determined the requirements of a simulated ward operation and presented and successfully carried out their recommendations. The author's conclusion is that automated data processing is not only feasible in a hospital but may well be the key to improved hospital operations.

17. Metallurgy

AD-405 432 Div. 17
OTS Prices: HC $5.00/None

Rocketdyne, Canoga Park, Calif.
EFFECTS OF LIQUID AND VAPOR CESIUM ON CONTAINER METALS.

Final rept. for 15 Jun 61-15 Sep 62,
by W. T. Chandler and N. J. Hoffman. Mar 63, 183p
Rocketdyne-R-3811
Contract AF33 616 8435, Proj. 7312, Task 731202
ASD TDR62 965

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Corrosive liquids, Cesium), (*Cesium, Corrosive liquids), (*Liquid metals, Cesium), Corrosive gases, Compatibility, Metals, Zirconium, Hafnium, Niobium, Niobium alloys, Zirconium alloys, Nickel alloys, Chromium alloys, Iron alloys, Titanium alloys, Molybdenum, Tantalum, Tungsten, High-temperature research, Containers, Vapors, Microstructure, Hardness.

The results from a program to investigate the compatibility of cesium with 310 stainless steel, Inconel-X, zirconium, hafnium, columbium, columbium - 1 percent zirconium alloy, molybdenum, tantalum, and tungsten are discussed. Static capsule tests at 1600 F and reflux capsule tests at 1800 and 2500 F were carried out for periods up to 720 hours. No significant corrosion was found after the 1600 F tests. Molybdenum dissolved significantly in the refluxing tests. The columbium - 1 percent zirconium alloy was the best material in the 2500 F reflux test, but was attacked intergranularly at the lower temperature. The latter attack was accompanied by the selective leaching out of zirconium, possibly due to fluxing of ZrO by Cs2O. (Author)

AD-417 390 Div. 17, 26
OTS Prices: HC $4.00

Clevite Corp., Cleveland, Ohio.
FIBER REINFORCEMENT OF METALLIC AND NONMETALLIC COMPOSITES.
Final summary technical rept. for 2 Oct 61-1 Feb 63,
by R. H. Baskey. Jul 63, 128p
Contract AF33 657 7139, Proj. 7 924V
ASD TDR63 619

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Composite materials, Fiber metallurgy), (*Fiber metallurgy, Composite materials), Reinforcing materials, Cobalt, Cobalt alloys, Nickel alloys, Chromium alloys, Stainless steel, Tungsten, Wire, Sheets, Tensile properties, Elasticity, Forging, Powder metallurgy, Sintering, Rolling (Metallurgy), Hot working, Mechanical properties, Non-destructive testing.

Manufacturing techniques were developed and successfully applied to produce improved strengh-to-weight values in metallic composite materials for structural applications in mission-oriented systems. Hot-pressed composites with matrices of cobalt, cobalt alloy L605, nichrome, and stainless steel, reinforced with 10 to 30 volume percent of 10, 5, or 2 mil tungsten wire, produced tensile strength values up to 2 times greater at room temperature and up to 17 times greater at 2000F than obtained for the unreinforced matrix material. The rolled sheets of these composite materials were strengthened less proportionately than the as-pressed material. At 2000F the tensile strengths of cobalt, cobalt alloy L605, and nichrome sheets containing aligned tungsten wires were approximately 6 times, 1.6 times, and 2 times greater, respectively than for pure cobalt, L605, and nichrome sheets. Random wire patterns strengthened the metal matrices at 2000F, but to a lesser degree than aligned wires. The applicability of the techniques developed was demonstrated by the accomplishment of 3 inch wide, crack-free sheets from compacts containing up to 30 volume percent of 5 mil wire and up to 20 volume percent of 10 mil wire. Canned compacts of cobalt, L605, and nichrome with 10, 20, and 30 volume percent of random tungsten wire were successfully forged to a reduction in thickness of 77 percent in open-face dies. (Author)

Patent 3,148,974 Div. 17

METHOD FOR SEGREGATING COPPER ORES.
Interior-assigned Patent,
by Carl Rampacek. 15 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Copper), (*Copper, Ores (Metal sources)), (*Ores (Metal sources), Refining (Metallurgy)), Heat treatment, Halides, Carbon, Mixtures, Furnaces.

The method is for segregating copper from low grade copper ore. The ore is preheated to from 500 to 900 degrees C. The heated ore, a halide salt and a carbonaceous material such as coal or charcoal are charged into a reactor furnace. The admixture is subjected to the heat from a controlled mixture of air and natural gas.

Patent 3,149,006 Div. 17

PREVENTION OF EMBRITTLEMENT OF METALS.
Interior-assigned Patent,
by William T. Abel and Desmond M. Bailey.
15 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Metallurgy), (*Metals, Brittleness), Tungsten, Molybdenum, Tantalum, Steel, Alloys, Additives, Oxidation, Gases, Oxygen, Carbon dioxide, Water, Mixtures.

Embrittlement of metals such as tungsten, molybdenum, tantalum and alloy steels containing these metals at high temperatures is prevented by adding an oxidizing gas such as oxygen, carbon dioxide, water and mixtures of these in amounts up to about 225 p.p.m.

Patent 3,149,966 Div. 17

OXIDATION RESISTANT CERIUM ALLOYS.
AEC-assigned Patent,
by Karl A. Gschneidner, Jr. 22 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cerium alloys), (*Cerium alloys, Oxidation), Scandium alloys, Lutetium alloys, Antioxidants.

The cerium base alloy is oxidant resistant at room temperature. The oxidizing inhibitor is scandium and lutetium. The alloy may contain 10 percent of the inhibitor and the balance cerium.

Patent 3,150,522 Div. 17

APPARATUS FOR MEASURING CORROSION RATES.
Air Force-assigned Patent,
by Carl W. Gerhardt. 29 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Measurement), (*Corrosion, Measurement), Coils, Springs, Scale, Weight.

The apparatus is used for measuring the effects of corrosion on a coil spring. One end of the spring is attached to an adjustable anchor. The other end is attached to an arm associated with a scale and a weight. As the spring corrodes it loses strength which shows on the scale.

Patent 3,150,964 Div. 17

PURIFICATION OF YTTRIUM METAL.
AEC-assigned Patent,
by Oscar N. Carlson, Frederick A. Schmidt, and Joseph A. Haefling. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Yttrium), (*Yttrium, Purification), Impurities, Fluorine, Oxygen, Yttrium compounds, Chlorides, Controlled atmospheres.

Yttrium metal is used in the construction of nuclear reactors. Fluorine-and oxygen-containing contaminants are removed from yttrium metal by equilibrating it with molten yttrium chloride at 950 to 1000 degrees C. in an inert atmosphere at superatmospheric pressure. The impurities are taken up by the yttrium chloride which is separated from the yttrium metal.

PB-166 285 Div. 17, 4
OTS Prices: HC $2.00/MF $0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRODEPOSITION OF TITANIUM FROM AQUEOUS SYSTEMS,
by Ernest J. Breton. Dec 52, 36p
WADC TR52 232; AD 2 163
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Titanium, Electrodeposition), (*Electrodeposition, Titanium), Reviews, Metal films, Electrolytes, Salts, Organic compounds, Alcohols, Tartrates, Sulfates, Complex compounds, Solutions, pH, Electrochemistry, Metal coatings.

A survey of published and unpublished literature on the electrodeposition of titanium was made. Efforts to electrodeposit titanium fell into three main categories - electrodeposition from fused salts, electrodeposition from organic media and electrodeposition from aquenous systems. The survey indicated that additional studies into electrodeposition from aqueous systems was warranted before concentrating on fused salt or organic systems. High pH, low pH and alloy aqueous baths were investigated. The most promising results were obtained from an aminated titanium catachol system operating at a low pH. A discussion of the theoretical aspects of electrodepositing titanium from aqueous systems is included. (Author)

PB-166 369 Div. 17, 14, 22
OTS Prices: HC $3.00/MF $0.75

Rock Island Arsenal Lab., Ill.
INVESTIGATION OF THE WATER DISPLACEMENT TEST AND COMPOUNDS.
Rept. no. 19,
by David Bootzin. 17 Sep 48, 98p
Proj. TB5 6101
RIAL 48 1003 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gun components, Corrosion inhibition), (*Corrosion inhibition, Surface-active substances), (*Surface-active substances, Test methods), Antioxidants, Specifications, Water, Abrasive blasting, Coatings.

The object of the paper is to review the water displacement test described in U. S. Army Tentative Specification AXS-1759 and to study the type of compounds submitted in order to determine whether the test was adequate or whether it needed to be modified to allow less critical evaluation of materials submitted. The subject of water displacement and compounds was investigated under four main topics: Analysis of the test method, Behavior of the rust preventives with water additions, Applicability of these water displacing compounds as fingerprint removers due to current interest in fingerprint removers, and A preliminary survey of surface active agents used for water displacement. (Author)

PB-166 370 Div. 17, 14, 22
OTS Prices: HC $1.00/MF $0.50

Rock Island Arsenal Lab., Ill.
EFFICIENCY OF WATER DISPLACEMENT FROM SANDBLASTED AND PHOSPHATED SURFACES DETERMINED RADIOMETRICALLY.
Rept. no. 15,
by Stanley L. Eisler. 16 Nov 51, 20p
Proj. TB5 6010A
RIAL 51 4457
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gun components, Corrosion inhibition), (*Corrosion inhibition, Tracer studies), (*Surface-active substances, Tracer studies), Abrasive blasting, Phosphate coatings, Labeled substances, Sulfur, Sodium compounds, Sulfates, Water, Test methods.

Ten commercial compounds were tested for water displacement efficiency using both sandblasted and phosphated test specimens. A radiometric method employing radiosulfur described in a prior report was used for these tests (see PB-166 372). Exposure tests on sandblasted panels only were also conducted to check prior results. (Author)

PB-166 372 Div. 17, 14, 22
OTS Prices: HC $2.00/MF $0.50

Rock Island Arsenal Lab., Ill.
RADIOACTIVE TRACER METHOD FOR EVALUATING WATER DISPLACING COMPOUNDS.
Rept. no. 13,
by Stanley L. Eisler. 31 Oct 50, 30p
Proj. TB5 6010A
RIAL 50 2557
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gun components, Corrosion inhibition), (*Corrosion inhibition, Tracer studies), (*Surface-active substances, Tracer studies), Labeled substances, Films, Discoloration, Water, Radioactive isotopes, Sulfur, Sodium compounds, Sulfates, Test methods, Abrasive blasting, Coatings.

A procedure employing a radioisotope as a tracer in the water to evaluate water displacing properties was developed. Fourteen commercial compounds were tested by this method and close agreement with present test methods resulted. (Author)

PB-166 495 Div. 17, 14, 31
OTS Prices: HC $1.00

Marine Engineering Lab., Annapolis, Md.
INVESTIGATION OF REMEDIAL MEASURES FOR COMBATING ACCELERATED OXIDATION INDUCED BY VANADIUM CONTAMINATION.
Research and development rept.,
by W. J. Greenert and L. G. Richards. 30 Dec 55, 20p
Proj. NSM000 003
MEL 040007BL; AD 94 580

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Vanadium, Contamination), (*Stainless steel, Oxidation), (*Protective treatments, Stainless steel), Surface properties, Impurities, Fuel contamination, Coatings, Alkaline earth oxides, Chromium alloys, Nickel alloys, Corrosion, Test methods, Paints, Steel, Antioxidants, Boilers.

The oxidation characteristics of vanadium contaminated surfaces as affected by various treatments were determined. It was found that coatings of certain alkaline earth oxides substantially reduced the accelerated oxidation of 25-20 Cr-Ni steel. In addition, the oxygen consumption test method was evaluated as a tool for measuring oxidation-corrosion. The soundness and reproducibility of the test were studied and the results are shown. (Author)

18. Military Sciences and Operations

No Entries

19. Navigation

AD-299 074 Div. 19, 1, 33
OTS Prices: HC $7.15/None

AVCO Corp., Cincinnati, Ohio.
OPERATIONAL TEST AND EVALUATION OF AIR TRAFFIC CONTROL CENTRAL AN/GSN-11.
Technical documentary rept. for Aug 61-Nov 62.
Jan 63, 412p AE-219-63-1
Contract AF19 604 7379
ESD TDR63 187

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.
Legibility is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Air traffic control systems, Glide path systems), (*Glide path systems, Radar landing control), Air traffic control terminal areas, Approach, Aircraft landing, Ground-controlled approach radar, Terminal guidance, Ground support equipment, Specifications, Performance (Engineering), Flight testing, Tables, Experimental data.

This report describes the live flight test of the AN/GSN-11 and gives the test results obtained. In spite of considerable difficulties with peripheral support equipment and staging of aircraft in the Atlantic City area, the AN/GSN-11 successfully demonstrated its capability to deliver live flight approaches to system specification and control philosophy. The greatest limitation both of system implementation and current control philosophy is the handling of aircraft after handoff to GCA, wherein precision of delivery to final approach deteriorates more than two to one by touchdown. Improvements to the systems's final approach calculation are recommended and nominal speed control advisories on final approach are suggested in order that the inherent delivery capability of the AN/GSN-11 be achieved at touchdown. With such improvements live test results indicate a capability to safely deliver aircraft at 60-second intervals. (Author)

Patent 3,153,234 Div. 19

FIXED ANTENNA TERRAIN CLEARANCE SYSTEM.
Navy-assigned Patent,
by Robert H. Begeman and Francis A. Marasco.
13 Oct 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Terrain avoidance), (*Terrain avoidance, Aircraft antennas), (*Antennas, Terrain avoidance), Navigational aids, Aircraft.

A fixed antenna is employed and its boresight is parallel to an aircraft air mass velocity vector. An angle gate channel is provided to restrict the presentation on an indicator screen to one representing obstructions or terrain existing in the primary portion of the antenna beam, thereby excluding presentations which might otherwise result as ambiguous returns from the outer extremities of the main lobe or from side lobe effects.

20. Nuclear Physics and Nuclear Chemistry

AD-418 579 Div. 20
OTS Prices: HC $6.00/None

Radiation Effects Information Center, Columbus, Ohio.
SURVEY OF IRRADIATION FACILITIES,
by Donald J. Hamman and Walter H. Veazie, Jr.
15 Sep 63, 244p REIC-31, pt. 1
Contract AF33 657 10085, continuation of Contract AF 33 616 7375, Projs. 7381, 7634, Task 738103
N63 22634

Unclassified report

Rept. REIC-7, AD-157 174 and PB-139 042, superseded; rept. REIC-7A, AD-210 767 and PB-139 042 S1, superseded; rept. REIC-11, AD-237 794 and PB-156 282, superseded; rept. REIC-16, AD-256 953, superseded.

Descriptors: (*Nuclear reactors, Test facilities), (*Research reactors, Directories), Nuclear physics laboratories, Nuclear industrial applications, Nuclear particles, Neutron flux, Fast neutrons, Particle accelerators, Betatrons, Cyclotrons, Linear accelerators, Synchrotrons.

Irradiation facilities generally available to U. S. Government agencies and their contractors are surveyed. Reactors operated at steady-state and pulsed conditions and gamma facilities are included. Wherever possible, the information has been tabulated. Particle accelerator machines are surveyed including betatrons, fixed-frequency cyclotrons, linear accelerators, potential-drop machines, and synchrotrons.

CAPE-1078 Div. 20

Savannah River Lab., Aiken, S. C.
MINIATURE CENTRIFUGAL CONTACTOR.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Nuclear engineering, Centrifuges), (*Centrifuges, Mechanical drawings), (*Remote control systems, Nuclear engineering), Radioactivity, Stainless steel, Materials, Operation, Sampling.

Drawings (15) are presented for the 16-stage contactor which is suitable for remote operation with highly radioactive materials. Housing is of stainless steel, and the stages are arranged in a circular configuration which allows a central gear drive for all of the bowls and a gear train drive for all mixers. Individual bowls and mixers are replaced by lifting out a single assembly. Thus it may be changed into a smaller unit or it can be split into two 7-stage units by replacing a mixer with a plug to allow withdrawal of the endstream. Each stage has an auxiliary feed inlet and provision for sampling both phases. In the prototype, the bowl section and drive shaft were separated. In this piece of equipment these two pieces were combined to improve fabrication technique and to increase strength. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1088 Div. 20, 8

Oak Ridge National Lab., Tenn.
DECADE SCALER WITH POSITIVE H-V POWER SUPPLY (Q-2188).
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Scalers, Mechanical drawings), Power supplies, Voltage, Signals, Geiger counters, Scintillation counters, Electronic equipment, Gain, Organic compounds, Halogens.

Drawings (10) are presented for a scaler that is equipped with a power supply ranging from 600 to 1800 v, an electronic scale of 1,000, and a four digit mechanical register. It includes a signal pentode plate-loaded preamplifier with a single gain of about 30. The scaler may be used with either organic or halogen quenched Geiger counters or any counter that has a fairly large input signal such as an alpha scintillation counter. For a listing of individual titles, see the Engineering Materials List (TID-4100) (AEC abstract)

CAPE-1094 Div. 20

Oak Ridge National Lab., Tenn.
INSTRUMENTS ASSOCIATED WITH FAST LOGIC FOR THE HIGH VOLTAGE LABORATORY (Q-2554).
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Particle accelerators, Mechanical drawings), Nuclear physics laboratories, Voltage, Instrumentation.

Drawings (11) are presented for equipment which is used with particle accelerators in the high voltage laboratory. The equipment consists of fast coincidence circuit for a pair spectrometer, PP-1 and NP-1 slow coincidence anticoincidence ciruits, fast coincidence circuit, inspector amplifier, M-2 inspector amplifier and discriminator, inspector unit (MP), DG-2 variable delay unit, digital discriminator 256-8 bits, 4-parameter time pickoff and inspection system, and a pulse generator (Avalanche Transistor) circuit. (AEC abstract)

Patent 3,145,182 Div. 20

METHOD FOR IMPROVING HYDROLYSIS RESISTANCE OF URANIUM CARBIDE CONTAINING COMPOSITION.
AEC-assigned Patent,
by Joseph P. Hammond and John D. Sease. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuels), (*Reactor fuels, Stabilization), (*Uranium compounds, Carbides), Hydrolysis, Inhibition, Binders, Coatings, Silicides.

A method is disclosed for fabricating a corrosion resistant uranium composition. The fuel composition comprises an internal structure of a uranium carbide distributed within a continuous matrix of a uranium silicide and a continuous adherent coating of the silicide integral with the internal structure.

Patent 3,149,047 Div. 20

RESILIENT MODERATOR STRUCTURE FOR NEUTRONIC REACTORS.
AEC-assigned Patent,
by Arthur P. Fraas. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor moderators), (*Reactor moderators, Patents), Nuclear reactors, Acrylic resins, Manufacturing methods.

A neutronic reactor moderator structure of stressed moderator blocks is fabricated by providing a multiplicity of elongated moderator blocks. Each of the blocks has a longitudinal bow. A multiplicity of stressed bundles of blocks are formed by cementing with methyl methacrylate a multiplicity of blocks while in a straightened condition. The bundles thus formed are installed into a restraining sleeve defining a fixed interior volume. The assembly is heated to remove the thermally-sensitive cement.

Patent 3,149,909 Div. 20

FLUIDIZED SOLIDS PROCESS FOR RECOVERY OF URANIUM FROM ZIRCONIUM-TYPE FUEL ELEMENTS.
AEC-assigned Patent,
by Loranus P. Hatch, James J. Reilly, and William H. Regan, Jr. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), Reactor fuel elements, Reactor fuel cladding, Zirconium, Uranium, Fluorine, Hydrogen compounds, Chlorides, Flotation, Particles, Solids.

Uranium is recovered from uranium bearing zirconium clad nuclear fuel elements. The zirconium is reacted with anhydrous hydrogen chloride. Then the uranium is contacted with gaseous fluorine. The improvement includes immersing the element in a bed of inert fluidized granular solid while carrying out the removal of the zirconium from the clad element.

Patent 3,150,051 Div. 20

PACKAGED NUCLEAR PLANT WITH INTEGRAL SUPER-HEATER AND PRESSURIZER.
AEC-assigned Patent,
by John H. Ammon. 22 Sep 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear power plants), (*Nuclear power plants, Patents), (*Pressurized water reactors, Patents), Generators, Pressure vessels, Steam, Steam power plants.

The integral nuclear plant is for the generation of superheated steam. An arrangement is provided in which a pressurized water reactor is utilized with steam generation equipment immersed in the primary water of the pressure vessel itself.

Patent 3,150,053 Div. 20

STEAM-WATER MIXING DEVICE FOR STEAM-COOLED REACTOR.
AEC-assigned Patent,
by Arthur J. Goldman and Gerard Breidenbach. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gas-cooled reactors), (*Gas-cooled reactors), Reactor fuel elements, Water, Steam, Fog, Reactor cores, Reactor coolants.

The apparatus is for mixing dry steam and water for use as the coolant within the fuel-containing tubes of a fog-cooled nuclear reactor. A unique mixing arrangement is utilized within the individual fuel containing tubes located within the core itself. The fuel coolant tubes form part of the mixing structure by being shaped into divergent nozzles immediately above the lower entrance into the core. The nozzles have many small holes.

Patent 3,150,055 Div. 20

REACTOR.
AEC-assigned Patent,
by Herbert E. Metcalf. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Reactor coolants), Nuclear particles, Rotation, Reactor operating.

The self-cooled neutronic reactor produces radiations for use in experimental work. A rotatable neutronically reactive composition is provided which is of sufficient mechanical stability and of such configuration that the rotating reactive composition itself can circulate coolant in adequate quantities to protect itself from overheating.

Patent 3,150,057 Div. 20

FUEL SUBASSEMBLY FOR NUCLEAR REACTOR.
AEC-assigned Patent,
by Harry O. Monson and Ernest Hutter. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel rods), (*Reactor fuel rods, Nuclear reactors), Fast reactors, Breeder reactors.

The fuel subassembly is for use in fast breeder reactors wherein the subassembly consists of a bundle of tightly spaced, elongated fuel rods within a hexagonal, metallic tube. Integral internal ribs extend across the faces of the hexagonal tube within the fuel zone to minimize bowing of the fuel rods.

Patent 3,150,159 Div. 20

REMOVAL OF HYDROCARBON DEGRADATION PRODUCTS FROM ORGANIC SOLUTIONS.
AEC-assigned Patent,
by John M. Schmitt. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), Solvent extraction, Hydrocarbons, Degradation, Fission products, Uranium, Zirconium, Niobium, Nitrates, Amines.

The liquid-liquid extraction process is for the separation of uranium values from an aqueous acidic solution containing the values together with nitrate values and zirconium and niobium fission product values. The process relates to the removal from the organic solution of hydrocarbon degradation products having a high extractive power for uranium fission products. An amine is used such as ethanol amine.

Patent 3,150,924 Div. 20, 4

PRETREATMENT OF URANIUM DIOXIDE TO PROMOTE ITS CONVERSION TO URANIUM TETRAFLUORIDE.
AEC-assigned Patent,
by Seymour H. Smiley, Donald C. Brater, and Charles C. Littlefield. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), (*Uranium compounds, Fluorides), Dioxides, Oxidation, Uranyl radicals, Nitrates, Chemical reactions.

The method relates to the conversion of an aqueous uranyl nitrate solution to UF4. The conversion is accomplished by a series of high-temperature chemical reactions. The improvement includes intimately contacting the UO2 with a dilute oxygen-bearing inert gas stream at a preselected temperature for a time sufficient to increase the hexavalent uranium content of the UO2 by an increment of 1 to 8 mole percent of the total uranium prior to contacting the UO2 with HF.

Patent 3,151,029 Div. 20

CORE ASSEMBLY FOR A NUCLEAR REACTOR.
AEC-assigned Patent,
by Frank Schwoerer. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor cores), (*Reactor cores, Patents), (Power plants (Establishments)).

The nuclear reactor is used as a source of power in a central station power plant. The assembly includes a circular cylindrical core containing fissionable material and three segments containing fertile material are placed around the core. The segments approximate the shape of a chevron.

Patent 3,151,034 Div. 20

CONSOLIDATED NUCLEAR STEAM GENERATOR ARRANGEMENT.
AEC-assigned Patent,
by Royal M. Douglass, Richard W. Earle, Harry Honig, Donald C. North, Jr. 29 Sep 64
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Patents), Generators, Stema power plants, Nuclear power plants.

The nuclear reactor incorporates a steam generator, primary circulating pumps and auxiliary systems contained within the walls of a single confinement. The containment vessel is filled almost completely with water at about atmospheric pressure and the nuclear pressure vessel is submerged completely within the containment water.

Patent 3,152,959 Div. 20

INJECTION METHOD AND APPARATUS FOR CONTROLLED FUSION DEVICES.
AEC-assigned Patent,
by Charles C. Damm. 13 Oct 64
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Thermonuclear reactions), (*Thermonuclear reactions, Particle beams), (*Particle beams, Injection), Injectors, Ion beams, Confinement.

The method is for injecting a plurality of neutral particle beams through a single entrance port into the confinement volume of a controlled fusion device. The method involves a plurality of ion beams, aligning these ion beams with a single entrance port into the confinement volume by passing them through suitable force fields, neutralizing these ion beams whereby the resultant neutral particle beams enter through the entrance port into the confinement volume.

Patent 3,152,984 Div. 20

METHOD OF DEHYDRATING AND INSOLUBILIZING AN AQUEOUS NUCLEAR REACTOR WASTE SOLUTION.
AEC-assigned Patent,
by Warren E. Winsche and Milton W. Davis, Jr. 13 Oct 64
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radioactive waste), (*Radioactive waste, Desposal), (*Desposal, Radioactive waste), Nuclear reactors, Sulfur, Chemical precipitation, Dehydration, Water, Solutions, Heat, Temperature.

An aqueous nuclear reactor waste solution is dehydrated and insolubilized by heating with sulfur to from 130 to 160 degrees C. to dehydrate it and drive off volatile components and decomposition products. The solution is then heated to about 350 degrees C. to insolubilize its other components.

21. Nuclear Propulsion

CAPE-1101 Div. 21, 31

Oak Ridge National Lab., Tenn.

NUCLEAR GAS ENGINE.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Marine nuclear propulsion, Mechanical drawings), Nuclear propulsion, Gas-cooled reactors, Engines and motors, Marine engines.

Preliminary study drawings (8) are available for a nuclear gas engine, a new type of prime mover especially suited for marine propulsion. It consists of a reciprocating engine coupled to a gas-cooled reactor. This system employs a single fluid circuit without high temperature heat exchangers. The system is insensitive to small leaks. The neutron economy is good, and fuel costs are low. For a listing of individual titles, see the Engineering Materials List (TID-4100) (AEC abstract)

Patent 3,150,054 Div. 21, 20

HIGH FLUID FLOW RATE NUCLEAR REACTOR.
AEC-assigned Patent,
by Robert H. Fox. 22 Sep 64
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear propulsion), (*Nuclear propulsion, Patents), Rocket motors, Reactor cores, Nuclear reactors.

The flow channels in a nuclear rocket engine converge inwardly in the radial direction from the core periphery to a central cylindrical void. Thus, the pressure drop forces and the frictional drag forces caused by flow through these channels are directed to the center of the core and keep the core in compression. The need for structural support is minimized.

Patent 3,153,444 Div. 21, 13, 20

HEAT EXCHANGER.
AEC-assigned Patent,
by David C. Purdy and James D. Carlton. 20 Oct 64
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Heat exchangers), (*Heat exchangers, Shipborne), (*Marine nuclear propulsion, Heat exchangers), Nuclear reactors, Heat transfer, Pipes.

The heat exchanger is arranged for the passage of a heating fluid in indirect heat transfer relationship with a fluid to be heated. It is for use in nuclear reactor systems and especially for marine applications. The structure includes tubes which are divided into separate groups so that they extend between corresponding inlet and outlet chambers. One or more groups of tubes can be removed from service while the remainder of them continue in operation.

22. Ordnance

Patent 3,146,672 Div. 22

MEANS FOR CHARGING HYDRAULIC SYSTEMS FOR GUNS.

Navy-assigned Patent,
by Philias H. Girouard, Carl V. Hickman,
Garold A. Kane, John I. Nelson, and Milton C. Neuman.
1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gun auxiliary equipment), (*Gun auxiliary equipment, Hydraulic systems), Gun chargers, Recoil mechanisms, Hydraulic accumulators, Guns, Shipborne, Design.

The gun is used aboard a ship and has a caliber of five inches or better. The system includes a gun mount for a gun which is operated in rapid-fire sequency by a hydraulic system including high pressure pumping equipment, and an accumulator. The gun has parts powered from the accumulator. A recoil mechanism is provided for the gun together with components actuated by the recoil of the gun for charging fluid into the accumulator system.

Patent 3,146,673 Div. 22

MEANS FOR INDEXING MULTIPROJECTILE CARTRIDGES INTO FIRING ALIGNMENT IN A MULTIBORE GUN.
Army-assigned Patent,
by Frederick P. Reed. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Feed mechanisms), (*Feed mechanisms, Patents), Guns, Gun components, Projectiles, Cartridges, Small arms, Design, Multiple operation.

The multibored firearm is provided with structure for automatically indexing multiprojectile cratridges to bring each projectile into axial alignment with a corresponding bore during movement into firing position. The indexing structure is incorporated in a longitudinally reciprocating bolt provided with a conventional extractor and ejector and is adapted to hilically rotated into locked battery position.

Patent 3,148,472 Div. 22

SUBCALIBER PROJECTILE AND SABOT FOR HIGH VELOCITY FIREARMS.
Army-assigned Patent,
by Edward N. Hegge and John P. McDonough. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Subcaliber projectiles), (*Subcaliber projectiles, Patents), (*Sabot projectiles, Hypervelocity guns), Small arms, Plastics.

The plastic sabot is for use with a projectile. A portion of the mating surfaces between the sabot and projectile is contoured to form a shear area which is capable of resisting relative movement between the sabot and the projectile during passage through the bore of the gun. The sabot disintegrates after leaving the barrel of the gun.

Patent 3,149,012 Div. 22

SMOKELESS POWDER CONTAINING ACRYLIC POLYMERS.
Navy-assigned Patent,
by Ralph F. Preckel. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive materials), (*Explosive materials, Acrylic resins, Explosive materials), Nitrocellulose, Nitrates, Polymers.

The granulated smokeless powder contains 15 to 50 percent nitrocellulose, 15 to 60 percent liquid explosive, nitric ester and from 5 to 30 percent of at least one polymerized material such as ethyl methacrylate.

Patent 3,149,329 Div. 22

PULSE DOPPLER/PROXIMITY SCORER.
Air Force-assigned Patent,
by Franklin H. Prestwood and Homer F. Roland.
15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Firing error indicators), (*Firing error indicators, Doppler radar), Fire control systems components, Radar targets, Radar equipment, Telemeter systems, Proximity devices.

The pulse Doppler/proximity radar scoring device detects moving objects within a precise radial distance from the sensing antenna. Hit information is telemetered to an external station when missile penetration occurs within the certain range boundaries. The system includes an antenna carried by the target, a transmitter aboard the target, a detector coupled to the antenna, a pulse reservoir component and a delay line coupled to the output lead of the detector.

Patent 3,149,532 Div. 22

SMOKE AND FLASH REDUCER.
Army-assigned Patent,
by Alan R. Pittaway and Stanley F. Mathews.
22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Small arms), (*Small arms, Gun barrel attachment), (*Gun barrel attachment, Small arms), Propellant flashes, Propellant noise, Gun smoke, Gun barrels, Recoil mechanisms.

The device is for attachment to the barrel of a rifle to reduce weapon sound, blast, and recoil. It increases the projectile muzzle velocity. The structure includes, in addition to the gas diverter, a closed casing which surrounds the diverter and contains a filter of steel wool into which the gases are discharged through the perforated wall of the diverter.

Patent 3,150,020 Div. 22

GASLESS IGNITER COMPOSITION.
Navy-assigned Patent,
by Earl E. Kilmer. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Delay elements (Explosive)),

(*Delay elements (Explosive), Igniters), (*Igniters, Delay elements (Explosive)), Pyrotechnics, Mixtures, Zirconium, Powders, Lead compounds, Monoxides, Wire.

The igniter mixture is for pyrotechnic delay compositions. The gasless composition is ignited by a hot wire. It consists of zirconium powder and lead monoxide.

Patent 3,150,450 Div. 22

BOREGAGE.
Army-assigned Patent,
by Baltzar Leo De Mare. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Meters), (*Gun barrels, Erosion), Measurement, Measuring devices (Electrical and electronic), Design.

The device measures the bore diameter of a gun tube to determine erosion in the tube. A sensing head is drawn through the tube by a motor driven chain or cable. The electrical output of the sensing head is fed to an electronic recorder through a Wheatstone bridge.

Patent 3,150,625 Div. 22, 9

HYDRODYNAMIC APPARATUS.
Navy-assigned Patent,
by John D. Brooks. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hydrofoils), (*Torpedoes, Stabilization systems), Pumps, Hydrodynamics.

The hydrofoil apparatus is for stabilizing a torpedo in water. Apparatus, including a pump, injects a liquid stream into the ambient water medium surrounding a stabilizing hydrofoil to form a liquid 'seal' separating the distinct zones acted upon by the unbalanced forces.

Patent 3,150,859 Div. 22

TRACK MAINTENANCE TOOL.
Army-assigned Patent,
by James A. Payne. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vehicle tracts), (*Vehicle tracts, Maintenance equipment), (*Jacks (Mechanics), Maintenance equipment), Tanks (Combat vehicles).

The jack is for removing and replacing endless tracks on combat tanks. The tracks are made up of tread units secured by pins. A single track connecting tool is used instead of the usual two adjusting tools. Pressure fluid is used to operate the jack.

Patent 3,152,511 Div. 22

GUN EJECTION MECHANISM.
Navy-assigned Patent,
by Arthur J. Stanton, David F. Anderson, and George B. Boniface. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ejectors (Ordnance)), (*Ejectors (Ordnance), Shipborne), Antiaircraft ammunition, Rockets, Rocket launchers, Gun components, Cartridge case extractors.

The rapid fire rocket launching system is adapted for shipboard antiaircraft use. It includes a gas operated empty ammunition case handling system for receiving, holding and ejecting the empty case in synchronism with the firing of the gun at all angles of gun elevation and train.

Patent 3,152,512 Div. 22

PUSHTHROUGH-TYPE CARTRIDGE BELT LINK WITH A BOLT ACTUATED CARTRIDGE RETAINING LATCH.
Army-assigned Patent,
by Richard H. Colby. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Feed mechanisms), (*Feed mechanisms, Automatic weapons), (*Automatic weapons, Feed mechanisms), Small arms, Gun components, Cartridge cases, Fastenings.

The cartridge belt link supplies cartridges to a machine gun. The cartridge belt is made up of a plurality of links, each link encircling a fragile cartridge along its entire length. The cartridge is held against radial displacement by an encircling retainer and is held against longitudinal displacement by a bolt actuated latch.

Patent 3,152,513 Div. 22

FIRING MECHANISM WITH BURST CONTROL.
Army-assigned Patent,
by Richard H. Colby. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Firing mechanisms (Weapon)), (*Firing mechanisms (Weapon), Automatic weapons), Gun components, Small arms.

A firearm is provided which has a barrel, an operating rod integral with the bolt arranged for reciprocation between a battery and a recoil position, and a firing mechanism. A firing mechanism is selected for firing one round, a burst or full automatic fire.

Patent 3,152,547 Div. 22

RADIO PROXIMITY FUZE.
Navy-assigned Patent,
by John W. Kyle. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radio proximity fuzes), (*Containers, Radio proximity fuzes), (*Radio proximity fuzes, Container), Ammunition components, Moisture-proofing, Hermetic seals, Encapsulation, Plastics.

The radio controlled fuse casing is impervious to moisture. The casing is divided into two separate compartments both of which are hermetically sealed. Subassemblies within the fuse are potted with a plastic.

Patent 3,152,935 Div. 22

FLARE COMPOSITION.

Navy-assigned Patent,
by Edgar A. Cadwallader. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flares), (*Flares, Incendiary mixtures), (*Incendiary mixtures, Flares), Pyrotechnics, Magnesium, Aluminum, Calcium compounds, Bombs, Halocarbon plastics.

The flare composition contains 25 to 40 percent by weight of polymerized trifluorochloroethylene and 60 to 75 percent of a material such as magnesium, aluminum or magnesium calcide. The composition is useful in the manufacture of disposable rocket fuel containers and for making flares, bombs and the like.

Patent 3,153,191 Div. 22, 30

TEST APPARATUS HAVING A SUSPENDED PERMANENT MAGNET FOR DETERMINING MAGNETIC EFFECTS OF MATERIALS.
Navy-assigned Patent,
by Arthur W. Obenschain and John E. Nicholson.
13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test equipment), (*Test equipment, Ordnance), (*Magnetic materials, Test equipment), Magnetic properties, Magnets, Permeability, Magnetic fuzes.

The device is for detecting the magnetic effects, if any, of non-magnetic parts and materials such as magnetic fuzes for ordnance hardware. A plastic case contains a permanent magnet suspended like a pendulum and having a pointer associated with it and a scale. It may be calibrated to read in permeability or other units.

Patent 3,153,368 Div. 22

AMMUNITION TRANSFER MECHANISM.
Navy-assigned Patent,
by Arthur J. Stanton, David F. Anderson, Russell T. Shawen, and John B. King. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Loaders), (*Loaders, Rocket assisted projectiles), (*Weapon systems, Loaders), Transfer switches, Shipborne, Antiaircraft ammunition, Projectiles, Rockets, Conveyors, Ammunition.

The mechanism is useful for employment in a weapon system adapted for shipboard antiaircraft use. The transfer mechanism transfers a rocket assisted projectile from a magazine to the launching device. It includes mechanical and electrical interlocks to insure proper passage of the projectile to the launching device.

Patent 3,153,394 Div. 22

BALLAST DROPPING APPARATUS FOR NEGATIVELY BUOYANT TORPEDO.
Navy-assigned Patent,
by Eugene L. Shaver and Richard J. Bridges. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Torpedo components), (*Torpedoes, Ballast), Exercise heads, Charges (Explosive), Hulls (Marine), Buoyancy, Circuits.

The exercise nose section is for use on the forward end of a negatively buoyant torpedo in lieu of its warhead section. The torpedo is buoyant when the ballast weight is detached from the hull. An electrical circuit explodes a charge when a pressure sensing device is activated at a predetermined depth. Explosion of the charge removes the ballast weight.

Patent 3,153,567 Div. 22, 4, 10

METHOD OF MAKING DECABORANE REACTION PRODUCT WITH HYDRAZINES.
Navy-assigned Patent,
by Neil R. Fetter. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive materials), (*Decaboranes, Explosive materials), (*Hydrazine derivatives, Explosive materials), Solid rocket propellants, Solid rocket propellant binders, Synthesis (Chemistry).

The products have use as solid rocket fuels, binders for these fuels, and components for explosives. A reaction product of decaborane and tetramethyltetrazene is prepared by adding tetramethyltetrazene to a cooled benzene solution of decaborane at a reaction medium of 0 degrees C. for about 30 minutes.

PB-166 513 Div. 22, 17
OTS Prices: HC $2.00/MF $0.50

Kaiser Aluminum and Chemical Corp., Spokane, Wash.
CORRELATION OF BALLISTIC PENETRATION RESISTANCE AND SPALLING TENDENCY WITH MECHANICAL PROPERTIES AND MICROSTRUCTURE IN 5083, MR19, AND MR20 ALUMINUM ALLOY ARMOR PLATE SAMPLES.
Phase rept. no. 7,
by J. B. Hess, N. L. Person, and F. M. Krill. 1 Mar 61, 26p KACC-MS-PR-61-9
Contract DA04 200 507ORD333, Projs. 593 32 003, 593 32 005
AD 252 042
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Armor plate, Aluminum alloys), (*Aluminum alloys, Armor plate), (*Terminal ballistics, Armor plate), Penetration, Mechanical properties, Microstructure, Vulnerability, Fracture (Mechanics), Shock (Mechanics), Tensile properties.

In ballistic tests of 5083, MR19 and MR20 alloy experimental armor plates of approximately equivalent yield strengths, the MR20 alloy spalled severely and the MR19 exhibited a slight tendency to spall, while no spalling occurred in the 5083. The ballistic penetration resistance of these alloys decreased in the order of increasing spalling tendency. The spalling tendencies of the MR20 and MR19 alloys were found to be probably due to a grain boundary type precipitation in these alloys. The notched impact energies determined from tensile notched impact tests increased in these alloys in the same order as their ballistic penetration resistances. (Author)

PB-166 514 Div. 22, 17
OTS Prices: HC $3.00/MF $0.75

Kaiser Aluminum and Chemical Corp., Spokane, Wash.

EXPLORATORY STUDY OF A PROJECTILE SIMULATOR PUNCH TEST TO PREDICT THE BALLISTIC PERFORMANCE OF ALUMINUM ALLOY ARMOR PLATE.
Phase rept. no. 12,
by N. L. Person. 5 Aug 60, 64p KACC-MS-PR-60-30
Contract DA04 200 507ORD333, Projs. 593 32 003, 593 32 005
AD 241 582

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Armor plate, Aluminum alloys), (*Aluminum alloys, Armor plate), (*Terminal ballistics, Armor plate), Simulators, Test methods, Test equipment, Vulnerability, Metal plates, Fragmentation ammunition, Penetration, Simulation.

The punch test ultimate load does not correlate with ballistic test results obtained with 20 mm fragment simulators fired at 45 degrees obliquity (V50/45 degrees, 20 mm FS PBL) for the aluminum alloys tested in this investigation. The test results showed little or no evidence that the test can be used to predict whether one alloy will give a higher PBL than another; nor will it discriminate between various fabricating procedures of a single alloy as pertaining to ballistic performance. The ultimate punch load for 5083 (lot 791576), MR19 and MR20 was reached when a tensile fracture (shear along a plane 45 degrees to direction of principal stress) occurred on the bottom side of the test plate. After the initial fracture, complete fracture consisted of shearing along the heavy slip lines that extended from the outer edge of the punch through the plate to the bottom side. This observation, along with the comparison made of ultimate punch load, tensile strength, and yield strength, indicates that the ultimate punch load for the Al-Mg-Mn strain hardening alloys is primarily dependent on the tensile strengths of the materials.

23. Personnel and Training

No Entries

24. Photography and Other Reproduction Processes

AD-426 996 Div. 24
OTS Prices: HC $6.00

Tecnifax Corp., Holyoke, Mass.
A CONTINUOUS TONE DIAZO REPRODUCTION SYSTEM.
Rept. for 11 Jan 62-1 Jul 63,
F. O. Trump and D. P. Habib. 2 Sep 63, 250p
Contract AF33 657 8002, Proj. 6272, Task 627204
ASD TDR63 751

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerial photographs, Photographic processing equipment), (*Photographic processing equipment, Design), Photographic images, Resolution, Photographic printers, Photographic film, Photographic materials, Ultraviolet equipment, Lighting equipment, Optical equipment, Collimeters.

A diazo printer-processor was developed for processing aerospace photographic materials on a high-speed basis. The device reproduces images with a resolution of 200 lines/mm through 3 generations at speeds up to 20 fpm for diazo materials and up to 60 fpm for silver halide materials. The equipment handles film sizes from 70 mm through 9-1/2 in. wide by 1,000 ft. long; has automatic exposure control; and has provisions for preventing degradation of the ambient operating environment.

CAPE-1060 Div. 24

Lawrence Radiation Lab., Univ. of California, Berkeley.
SCANNING PROJECTOR VA.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Optical scanning, Photographic film), (*Photographic projectors, Mechanical drawings), (*Photographic equipment, Design), Photography.

Drawings (332) are presented for the SP-VA scanning table, a projection scanning machine suitable for viewing a variety of film sizes including 35, 46, and 70 mm films and in formats containing from one to three films each. The film is advanced by a d-c servo system driving a capstan. Operator control is through a 'joystick.' For a listing of individaul titles, see the Engineering Materials List (TID-4100). (AEC Abstract)

Patent 3, 148, 606 Div. 24

FOCAL PLANE SHUTTER MECHANISM.
Navy-assigned Patent,
by Terry Thomas and Richard D. Dafrico. 15 Sep 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Camera shutters), (*Camera shutters, Automatic), Focusing, Camera components and accessories.

The automatic resetting focal plane shutter for a camera includes a curtain having an aperture, a mask fixed adjacent to the aperture, a rotatable clutch device and elements for transporting the curtain and mask in the opposite direction during resetting.

PB-166 519 Div. 24
OTS Prices: HC $2.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
TEST AND EVALUATION OF 9 BY 18 RECTIFIER FOR 12- AND 24-INCH FOCAL LENGTH PHOTOGRAPHY.
Interim rept.,
by Dale E. Howell. 7 Sep 56, 41p
Projs. 8 35 03 216, 8 35 03 016
AERDL 1460-TR; AD 115 826

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rectifiers (Photography), Tests), Aerial photography, Focusing.

This report covers the engineering tests of a 9 by 18 rectifier which was developed for the rectification of 12- and 24-inch focal length, 9- by 18-inch format aerial photography. The report concludes that: (a) The results of the engineering tests of the rectifier show that, if it is modified to be suitable for rectification by the point matching method and certain other minor deficiencies are

corrected, it would be suitable for the purpose intended. (b) A service test of the 9 by 18 rectifier by a military topographic unit is warranted. (c) There is a need for an investigation into the problems involved in laying a controlled mosaic with long focal length, 9 x 18 inch format photography, with particular emphasis upon the requirements and tolerances for establishing control with the slotted templet method.

25. Physics

AD-401 678 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Unified Science Associates, Inc., Pasadena, Calif.
STABLE DENSE COLD PLASMA.
Semiannual summary rept. for period ending 20 Feb 63.
8 Apr 63, 24p
Contract Nonr3437 00, ARPA Order 194 62
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solutions, Electrical conductance), (*Ammonia, Solutions), (*Sodium, Solutions), Phase studies, Gases, Liquids, Plasma physics, Experimental data.

A major objective of the program has been achieved, namely that of establishing that sodium-ammonia solutions have high electrical conductivities in the gaseous state, the range of 1 to 100 mhos/cm already having been obtained. A remarkable feature f the data is that the conductivities in the gas phase above 134 C are greater than those in the liquid phase at room temperature. This feature is related to the fact that the temperature of the conductivity maximum is close to the critical temperature. (Author)

AD-402 814 Div. 25, 8, 6
OTS Prices: HC $4.00

Technical Research Group, Melville, N. Y.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF OPTICAL HETERODYNING.
Final rept.,
ed. by James LaTorrette. 22 Feb 63, 126p
TRG-172-TR1
Contract AF33 657 8060, Proj. 4335, Task 433513
ASD TDR63 237
Unclassified report

Descriptors: (*Mixers (Electronics), Lasers), (*Lasers, Mixers (Electronics), (*Piezoelectric transducers, Lasers), Amplifiers, Demodulation, Demodulators, Discriminators, Oscillators, Frequency modulation, Magnetic fields, Neon, Xenon, Feedback, Circuits, Frequency stabilizers, Light communication systems.

By means of a negative feedback loop employing a piezoelectric transducer, the frequency of a laser has been locked to a second laser transmitter. A tracking accuracy of plus or minus 3 kc or 1 part in 10 to the 11th power of the laser frequency has been achieved. By means of this AFC laser, a signal transmitted by frequency modulating the output of the second independent laser is detected by optical heterodyning to an IF frequency of 10.7 Mc and thereafter employing a standard IF amplifier, limiter, and discriminator, and then a 50 kc detector for the information band. Further work to improve this system is recommended. Frequency stabilization of a single laser is studied theoretically, and possible solutions are proposed and discussed. (Author)

OTR-110 Div. 25
OTS Price: $0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
THERMOELECTRIC MATERIALS AND FABRICATION.
Dec 64, 36p Unclassified report

Descriptors: (*Thermoelectricity, Materials), (*Bibliographies, Thermoelectricity), Reviews, Abstracting, Thermocouples, Bonding, Test methods, Packaging, Liquids, Lead alloys, Zinc alloys, Tellurium alloys, Physical properties, Chemical properties, Energy conversion, Semiconductors, Boron compounds, Phosphides, Gold alloys, Nickel alloys, Sodium compounds, Chlorides, Zinc compounds, Copper compounds, Sulfides, Ultrasonic radiation, Silicon, Germanium, Joining, Antimony alloys, Plating, Nickel, Bismuth alloys, Coatings, Tungsten alloys, Selenium alloys, High-temperature research.

Significant reports covering the period since 1961 were selected for this study, with reference to relevant earlier works. Recent Government-sponsored research and development in thermoelectricity has proceeded along three lines: (1) investigation of new materials with high figures of merit combined with desirable physical and chemical properties, (2) improvement of these properties in known thermoelectric materials, and (3) improvement of bonding techniques, testing procedures, and module fabrication methods. Significant results have evolved in each of these areas. Materials having figures of merit as high as .05/C have been found. Several liquid systems appear promising. The physical and chemical properties of lead and zinc telluride have been substantially improved. Bonding methods have been improved to form mechanically effective, low resistance electrode junctions. (Author)

Patent 3,149,301 Div. 25

ELECTROACOUSTIC TRANSDUCER.
Navy-assigned Patent,
by Charles E. Green. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electroacoustic transducers), (*Electroacoustic transducers, Specifications), Underwater sound equipment, Watertight fittings, Electromechanical converters.

The transducer is capable of deep-submergence and contains no acoustically compliant materials. It is a completely watertight unit comprising two end masses, each of rigid material, interconnected by an electromechanical converter. The end masses, in part, extend toward each other, one of them telescopically overlapping the other at a watertight connection between their ends to form an envelope for the converter, the third main element in the transducer.

Patent 3,149,910 Div. 25, 8

METHOD OF GROWING SINGLE CRYSTALS.
Army-assigned Patent,
by Arthur Tauber and Robert O. Saveage, Jr.
22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Crystal growth), (*Crystal growth, Single crystals), (*Single crystals, Crystal growth), Barium compounds, Iron compounds, Zinc compounds, Oxides, Magnetic properties, Microwave equipment, Millimeter waves.

The crystals are used in microwave and millimeter device applications. The crystal prepared by the method is a magnetic oxide of barium, iron and zinc.

Patent 3,150,925 Div. 25

METHOD OF GROWING SINGLE CRYSTALS.
Army-assigned Patent,
by Richard J. Gambino. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Crystal growth), (*Crystal growth, Single crystals), (*Single crystals, Crystal growth), Barium compounds, Metals, Oxides, Mixtures, Melting, Nitric acid, Solutions, Magnesium compounds, Zinc compounds, Cobalt compounds, Nickel compounds, Iron compounds, Sodium compounds, Carbonates, Crystallization.

Single crystals are made by dissolving a mixture of BaO, MeO, where Me is at least one divalent metal cation selected from the group Mg, Zn, Co, Ni, or Fe2 and Fe2O3 in Na2CO3 at a temperature of about 1300C, crystallizing the compounds by reducing the temperature 1 degree to 5 degrees C. per hour to between 1000C. and 1050C., and recovering the crystals by treating the solidified melt with hot, dilute nitric acid solution.

26. Production and Management

AD-416 743 Div. 26, 1, 12, 32
OTS Prices: HC $7.00/None

Metcut Research Associates, Inc., Cincinnati, Ohio.
THE DESIGN OF A SYSTEM FOR COLLECTING, EVALUATING AND DISSEMINATING MACHINABILITY DATA FOR AEROSPACE MATERIALS.
Final rept. for 21 Jun 62-21 May 63,
by John Maranchik, Jr., Arthur L. Holt, Leonard A. Nienaber, Andrew O. Atkinson, and John F. Kahles.
Jul 63, 308p
Contract AF33 657 8796, Proj. 7 951
ASD TDR63 572
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Machining, Documentation), (*Documentation, Machining), Aircraft, Spacecraft, Materials, Information retrieval, Data processing systems, Material removal, Data storage systems, Computers, Models (Simulations), Punched cards, Data, Bibliographies, Classification, Indexes, Periodicals, Reports, Reviews, Subject indexing.

A system has been designed and tested through model operation for collecting, evaluating, storing, retrieving, and disseminating machining information for aerospace materials. Both conventional and special machining methods are covered, and the system has been mechanized using punch card equipment with provision for conversion to more powerful equipment when needed. Based on an eleven-month study of users, machining literature, systems literature, and related technical information centers, this design identifies basic functions for a Machining Information Center. Functions for technical engineering personnel include surveillance of developments, acquisition of information, review and evaluation of inputs and outputs, search formulations, experimental verification, special studies of machining information, assistance to users, and selection of disposable items. Support functions involve document control and scheduling, conversion of information to mechanized or microfilm form, file maintenance and processing, physical preparation of output material, and custody of documents. (Author)

CAPE-1125 Div. 26, 20

Hanford Atomic Products Operation, Richland, Wash.
EXTRUSION PRESS, 280 TON.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Presses (Machinery), Mechanical drawings), (*Extrusion, Presses (Machinery)), Aluminum, Plutonium, Spikes, Reactor fuel elements, Dies, Lubricants, Surface properties, Oils, Graphite.

Drawings (20) are presented for an extrusion press used in the fabrication of aluminum-plutonium spike enrichment fuel elements. As-cast billets are hot extruded at a 27 to 1 reduction using flat face shear dies and a colloidal suspension of graphite in oil as the die and container lubricant. Extrusion temperature is 525C; ram speed is 20 in. per minute while extruding the 200 in. cores. An excellent surface is obtained on 0.502 in. dia. cores. The press is enclosed in a glove box. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1136 Div. 26, 20

Oak Ridge National Lab., Tenn.
HOMOGENEITY SCANNER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Radiography, Mechanical drawings), Quality control, X ray photography, Reactor fuel rods.

Fifty-eight drawings are included. The scanner is used in high speed homogeneity evaluation of fuel rods or plates. It employs industrial x-ray equipment as the radiation source and a combined NaI(Tl) crystal-photomultiplier tube as the radiation detector. The equipment employs the x or y ray attenuation principle. The scanner longitudinal drive is provided by a 200 v (3-) motor that is equipped with a Graham transmission coupled to a 1 1/2 in. dia five-pitch lead screw. Maximum travel is 56 in. with continuous variable speed from 0 to 150 in. per min. Transverse drive is provided by a bifilar-wound Slo-Syn motor driving a 1/2 in. dia ten-pitch lead screw. A motor on each end of the transverse mechanism provides drive pulses. Maximum transverse travel is 5 in. with continuously variable speeds of from 0 in. to 16 in. per min. A scaler, with associated circuitry, provides a means for automatic transverse indexing in increments of 0.0005 to 5 in. Fuel rods up to 50 in. long can be inspected and step rotated in increments of 1.8 degrees or helically scanned with any desired pitch. (AEC Abstract)

Patent 3,148,707 Div. 26

AUTOMATIC HYDRAULIC BUFFER.
Air Force-assigned Patent,
by Alexander Smykio. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hydraulic pressure pumps), (*Hydraulic pressure pumps, Patents), Pressure regulators.

The buffer is used with hydraulic pumps for supplying high pressure fluid for driving hydraulic motors and actuating devices. Apparatus is provided which reduces the pressure differential across the seal rings of the floating piston of a hydraulic buffer during shut-down in order to prolong ring life.

Patent 3,148,755 Div. 26

POSITIVE CLUTCH WITH INTERMESHING GEAR TEETH.
Army-assigned Patent,
by Frank T. Pisano. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Clutches), (*Clutches, Patents), Transmission gears.

The clutch requires less force for shifting. A sun gear continually engages opposed pairs of planetary gears with one shaft fixed to the sun gear and a casing enclosing the gears is fixed to an opposite shaft. A slidable member on one of the shafts shifts one pair of planetary gears into and out of engagement with the other pair of planetary gears. When the pairs of planetaries engage one another the clutch is in for driving one shaft from the other.

Patent 3,149,216 Div. 26, 4, 8, 25

APPARATUS FOR THE PREPARATION OF HIGH PURITY SILICON.
Navy-assigned Patent,
by Lawrence M. Hagen and Walter F. Leverton.
15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Silicon), (*Silicon, Preparation), Semiconductors, Purification, Silicon compounds, Chlorides, Distillation, Ammonia, Amides, Nitrides, Decomposition, Zone melting, Industrial equipment.

The crystalline silicon is of semiconductor grade. The apparatus is utilized for obtaining the silicon employing the thermal decomposition of high purity silicon nitride. The steps include refining silicon tetrachloride by distillation, reacting pure silicon tetrachloride with pure ammonia, heating silicon amide to form silicon nitride, heating the silicon nitride to decompose it into silicon and nitrogen, crushing the silicon until all silicon nitride is decomposed and purifying the silicon by zone segregation.

Patent 3,150,936 Div. 26, 4, 17, 20

TUNGSTEN TUBING EXTRUSION BILLET.
AEC-assigned Patent,
by James G. Hunt. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pipes), (*Tungsten, Pipes), (*Extrusion, Tungsten), Molybdenum, Steel, Nuclear reactors, Chemicals, Processing.

The extrusion billet includes a frangible solid core, an annular sleeve of molybdenum and steel surrounding the core and a second annular tungsten sleeve surrounding the first sleeve. The billet is used in the chemical processing and nuclear reactor fields.

Patent 3,153,482 Div. 26, 14

LUBRICATION OF MANDRELS FOR TUBE EXTRUSION.
AEC-assigned Patent,
by Billie J. Buntz and Lester A. Unnerstall. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lubrication), (*Lubrication, Extrusion), (*Extrusion, Lubrication), Pipes, Mandrels, Uranium, Lubricants, Bearings.

The apparatus provided better concentricity of extruded uranium tubing. The arrangement includes filling a piercing cap with lubricant and providing a lubricant well around the mandrel just ahead of a guide bearing positioned close to the billet so that as the mandrel is driven forward the lubricant is forced back into the lubricant well thereby lubricating the mandrel after the mandrel passes through the guide bearing.

Patent 3,153,541 Div. 26, 13, 14

GASKET ASSEMBLY.
Army-assigned Patent,
by Elbert Rudder. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gaskets), (*Gaskets, Patents), Seals (Stoppers), Heat-resistant materials, Pressure.

The gasket is effective in high temperature and pressure flow systems. The gasket structure includes a one-piece metallic generally H-shaped core and a bartite generally convex resilient seal. The seal is bonded to the core.

PB-166 430 Div. 26, 30
OTS Prices: HC $5.00/MF $1.00

RAND Corp., Santa Monica, Calif.
A HEURISTIC PROGRAM FOR ASSEMBLY LINE BALANCING,
by Fred M. Tonge. 18 May 60, 155p P-1993
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Scheduling, Industrial production), (*Management engineering, Scheduling), (*Industrial production, Scheduling), Industries, Machine shop practice, Operations research, Combinatorial analysis. Digital computers, Programming (Computers).

By assembly line balancing is meant the process of assigning jobs to workers stationed along a continuous assembly line. The work of Newell, Shaw, and Simon on heuristic problem-solving, although oriented toward human cognitive process rather than industrial decisions, suggests both an approach to combinatorial problems using heuristic procedures and a method of employing electronic computers to carry out these procedures. The research reported here aims to extend these techniques to the solution of the assembly line balancing problem. The goals are: 1) to develop an acceptable, though not necessarily optimum, procedure for assembly line balancing. 2) to gain some understanding of the use of computers for implementing heuristic decision procedures in the industrial management area.

PB-166 485 Div. 26, 17
OTS Prices: HC $7.15/None

General Dynamics/Convair, San Diego, Calif.
SUB-ZERO MACHINING PROGRAM.

Final technical engineering rept. for Jan 59-Aug 60,
by S. Leith, W. L. Carr, and G. T. Heine. Nov 60, 317p
Contract AF33 600 38296, Proj. 7681
AMC TR60 7 681; AD 250 087

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Machining, Low-temperature research), (*Alloys, Machining), (*Coolants, Machining), Stainless steel, Cobalt alloys, Nickel alloys, Tool steel, Molybdenum alloys, Material removal, Economics, Carbon dioxide, Sprays, Freezing, Cutting tools, Experimental data, Titanium alloys.

The application of sub-zero coolants to machining high-strength, high-temperature alloys will, in certain applications increase metal removal rates up to 400%. These increases are not necessarily concurrent with cost reduction, because of the additional expense of sub-zero equipment, coolants and machine maintenance. The mechanical properties of the materials tested were not affected by sub-zero temperatures. Cost comparisons showed sub-zero coolants to be more economical in only one of the four tests when the machining of production parts was simulated. The results indicated that uninterrupted cutting operations on long cuts can be accomplished more efficiently with sub-zero coolants than with conventional coolants. Machining with sub-zero coolants is uneconomical on short runs and in interrupted cutting operations. The three sub-zero cooling methods evaluated were: (1) Application of CO2 mist at the cutting edge (-81F to -101F). (2) Flooding the workpiece and tool with ABCO 156 A Solvolene (-58F). (3) Freezing the workpiece in a cold chest (-110F) prior to machining. The machining operations performed were turning, milling, drilling, tapping and grinding. The materials used in the tests were: A-286, an austenitic stainless steel; L-605, a cobalt base alloy; R-235, a nickel base alloy; H-11, a hot-work die steel; Mo-0.5Ti, a molybdenum base alloy. Room-temperature tests were performed with conventional coolants to establish tool geometry, tool material, feed and cutting speed for comparison with sub-zero machining tests. The results are presented in graphical form (Author)

27. Propulsion Systems

AD-404 849 Div. 27, 7, 12
OTS Prices: HC $4.00

Vickers, Inc., Torrance, Calif.
HYDROGEN-OXYGEN INTERNAL COMBUSTION ENGINE.
Final rept. for 15 Jun 61-15 Sep 62,
by R. C. Thomas, W. A. Bass, and N. E. Morgan.
Mar 63, 123p
Contract AF33 616 8406, Proj. 3145, Task 314501
ASD TDR62 961

Unclassified report

Descriptors: (*Internal combustion engines, Spaceborne), Generators, Fuel systems, Hydrogen, Oxygen, Fuel injectors, Carburetors, Combustion chambers, Ignition systems, Catalysts, Fuel consumption, Valves, Lubrication systems, Lunar surface vehicles, Propulsion, Spacecraft, Electric power production.

Two hydrogen-oxygen fueled internal combustion engines were constructed and tested. Both engines operated on a uniflow two-stroke cycle principle. One engine utilized direct cylinder injection of oxygen into the previously admitted charge of hydrogen. The other engine featured external mixing of hydrogen and oxygen in a carburetor (mixing chamber), with combustion occurring after admission of the gas mixture to the cylinder. Potential application of these engines is in the field of power generating systems for space vehicles and lunar surface operations. (Author)

AD-408 774 Div. 27, 12
OTS Prices: HC $4.00/None

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
THEORETICAL AND EXPERIMENTAL RESEARCH ON THERMAL ARC JETS.
Final rept. for Jul 61-May 62,
by M. Chen, J. F. Connors, and R. R. John. Aug 62,
107p RAD-TR-62-26
Contract AF33 616 8504, Proj. 3141
ASD TDR62 616; AD 409 572 canceled

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Arc-jet engines, Performance (Engineering), Heat transfer, Alternating current, Direct current, Electrodes, Hydrogen, Cooling.

Results are presented from a combined experimental and analytical program on a comparison of direct and single-phase alternating current arc-jet-engine performance and from a study of scaling and heat-transfer relations for a series of direct-current arc-jet engines. Engine-propulsion-performance measurements are given for a hydrogen radiation-cooled arc-jet engine operated on both single-phase alternating-current (1000 to 1500 cycles per second) and direct-current power over the range from 20 to 50 kilowatts. Results are presented for experimental scaling and heat-transfer studies on three different direct-current, hydrogen radiation-cooled arc-jet engines having nominal power ratings of 5, 30, and 50 kilowatts. (Author)

Patent 3,148,508 Div. 27

CLOSED CYCLE POWER PLANT.
Navy-assigned Patent,
by Horace E. Karig. 15 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Underwater propulsion), (*Underwater propulsion, Steam), Submarines, Torpedoes, Steam power plants, Boilers, Combustion, Fuels, Marine propulsion.

The power plant is for propelling torpedoes and submarines. The principal components of the power plant may be devided into a high pressure or hot gas side and a low pressure or steam side. The hot gas side generates heat energy by the combustion of fuel. The purpose of the steam side is to receive the heat energy and convert it to work in an engine and recirculate the steam for again elevating its energy content. A boiler or steam generator connects the two sides.

Patent 3,150,485 Div. 27

VARIABLE THRUST ROCKET ENGINE.
Navy-assigned Patent,
by Frederick R. Hickerson. 29 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Controllable-thrust rocket motors), (*Controllable-thrust rocket motors, Patents), Engines and motors, Rocket motors, Design.

The reaction engine includes a throttling assembly for simultaneously varying the propellant and exhaust areas, so that the combustion chamber is constant for all degrees of throttling; which has a simplified propellant injection system for complete control of their introduction; which is furnished with an igniter for use of hypergolic or non-hypergolic propellants and by which only a portion of the oxidizer need be decomposed; in which starting may be accomplished though the engine is fully throttled; and in which there is a minimum of complex moving parts.

Patent 3,153,323 Div. 27, 1

INTERNAL COMBUSTION APPARATUS.
Navy-assigned Patent,
by James R. Hamm. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Internal combustion engines), (*Internal combustion engines, Gas turbines), (*Gas turbines, Aircraft engines), Power equipment, Axial-flow compressors, Engines and motors, Design.

The gas turbine power plant structure includes an outer casing structure, and an inner core structure. The operating elements include an axial-flow compressor, combustion apparatus and a turbine which is operably connected to the rotor of the compressor by an axially disposed shaft. The casing structure is mounted in or on the fuselage or wing of an aircraft. The structure is such that there is a recirculation of a part of the hot products of combustion through fuel vaporizing apparatus.

Patent 3,150,486 Div. 27, 12

COOLED REACTION CONTROL DEVICE.
Navy-assigned Patent,
by Heinrich J. Hollstein. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Rocket components), (*Rocket components, Cooling), Thrust, Control, Coolants, Vaporization.

The thrust control device is capable of withstanding high temperature rocket chamber conditions by the cooling of critical impinged surfaces. This is done by using a hollow control surface having vent openings adjacent the critical surfaces. Within the hollow control surface is a source of a coolant having a high heat-absorption capability, which when heated vaporizes and is gradually discharged through the vent openings thereby cooling the surfaces.

Patent 3,153,324 Div. 27, 1, 10

SIMPLIFIED PRIMARY FUEL SYSTEM.
Navy-assigned Patent,
by Robert E. Meyer. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fuel systems), (*Fuel systems, Jet engines), (*Engine fuel systems components, Afterburners), Aircraft engines, Manifolds (Engines), Engines and motors, Design.

The afterburner assembly is downstream of an aircraft jet engine which includes a compressor, combustion apparatus and a turbine. A fuel manifold is provided wherein the number of individual fuel orifices is reduced at a given fuel flow condition allowing use of larger orifices which are less likely to clog. The afterburner has a stagnation area at the front of the flamethrower which is used as a fluid flow route.

28. Psychology and Human Engineering

PB-166 378 Div. 28, 11
OTS Prices: HC $1.00/MF $0.50

Army Medical Research Lab., Fort Knox, Ky.
AN OPTIMUM RANGE OF SEAT POSITIONS AS DETERMINED BY EXERTION OF PRESSURE UPON A FOOT PEDAL,
by William B. Martin and Eward E. Johnson.
15 Jun 52, 14p
Proj. 6 95 20 001
AMRL 86; AD 21 654
Unclassified report

Descriptors: (*Human engineering, Seats), Anthropometry, Army personnel, Feet, Pressure, Reaction kinetics, Vehicles.

The object of the research was to determine an optimum range of seat positions for exertion of pressure upon a foot pedal. Tests on 166 men with anthropometric measurements representative of Army male personnel in general revealed that: (1) for the positions in which the most pressure was exerted (25 per cent of total positions tested) the mean vertical adjustment of the pedal was 2.4 inches above the seat and the mean horizontal adjustment from seat to pedal was 33.2 inches; (2) the mean vertical adjustment for the position at which most foot pressure could be applied was 3.5 per cent of the average body height (SD = 2.7%) and the mean horizontal adjustment was 47.5 per cent of the average body height (SD = 2.3%); and (3) in generalizing for the average height of Army male personnel (68.4 inches) the position at which the greatest pressure could be exerted upon a foot pedal would require a vertical distance from seat to pedal of 2.4 inches plus or minus 0.3 inch, and a horizontal distance of 32.5 inches plus or minus 4.25 inches.

PB-166 409 Div. 28, 1
OTS Prices: HC $1.00/MF $0.50

Aerospace Crew Equipment Lab., Naval Air Engineering Center, Philadelphia, Pa.
HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT. PART 5. EXPERIMENTAL EVALUATION OF A PROPOSED THEORY OF WHITENESS CONSTANCY,
by William O. Hambacher. 15 Aug 56, 23p
Proj. TED NAM EL52004
NAEC-ACEL 297; AD 112 766
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Illumination, Human engineering), (*Cockpits, Illumination), Vision, Adaptation (Physiology), Reading, Light, Brightness, Pilots, Naval aircraft.

The report presents research done to evaluate a proposed theory of whiteness constancy for application to aircraft work space lighting with special emphasis on cockpit lighting. The results obtained support the hypothesis that subjects, when adjusting the variable disc to equality with the standard, form equal whiteness ratios; i.e. the

variable disc is adjusted so that the ratios of the whitenesses of the standard disc to its background and the variable disc to its background are equal. At present this hypothesis is valid only for the condition of homogeneous backgrounds of the standard and variable discs.

PB-166 410 Div. 28, 1
OTS Prices: HC $1.00/MF $0.50

Aerospace Crew Equipment Lab., Naval Air Engineering Center, Philadelphia, Pa.
HUMAN ENGINEERING INVESTIGATION OF INTERIOR LIGHTING OF NAVAL AIRCRAFT. PART 1. COLORING FOR SINGLE SEAT AIRCRAFT COCKPITS.
Topical rept.,
by John Lazo. 23 Apr 54, 22p
Proj. TED NO. NAM EL52004
NAEC-ACEL XG T214; AD 36 619

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also PB-132 415, -132 416, and -132 417.

Descriptors: (*Naval aircraft, Illumination), (*Cockpits, Colors), (*Human engineering, Cockpits), Paints, Reflection.

The employment of neutral color paints whose reflectivity is not greater than 23% for certain aircraft cockpit surfaces is not objectionable to pilots. The employment on these same surfaces of neutral color paints whose reflectivity is greater than 29% is objectionable to pilots. The use of higher reflective paints than the presently employed black for the windshield framing and the console surfaces is objectionable to most pilots. Blue or green colored cockpit surfaces approximately 22% reflective with .2 chroma are not as desirable for aircraft cockpit application as neutral color paints or lower chroma paints. The use of AN color no. 621, Dark Gull Gray, for single seat fighter type aircraft instrument panels, side bulkheads and floor areas is desirable. An improvement in instrument panel appearance and utility in daylight will result when the areas around the dial faces including instrument lighting fixtures, both the standard and the 'Post Lite' type, are gray-painted.

PB-166 414 Div. 28
OTS Prices: HC $3.00/MF $0.75

American Psychological Association, Inc., Washington, D. C.
THE DISCOVERY AND DISSEMINATION OF SCIENTIFIC INFORMATION AMONG PSYCHOLOGIST IN TWO RESEARCH ENVIRONMENTS,
by Arthur H. Brayfield. Sep 64, 92p
APA-PSIEP-11
Grant NSF GN281, continuation of NSF Grant G18494

Unclassified report

Descriptors: (*Psychology, Scientific personnel), (*Scientific personnel, Social communication), (*Scientific research, Social communication), Attitudes, Behavior, Universities, Personality, Instructors, Students, United States government, Laboratories, Periodicals.

The study presented in this report deals with those members of the faculty of a large university who are guiding or actively engaged in research in the field of psychology and the media of information exchange (formal and informal, archival and non-archival) which they utilized. The first two sections provide information with regard to the sample and setting, show the degree to which information exchange activities are determined by personality and other personal factors such as administrative responsibility, and illustrate the manner in which an academic environment encourages and facilitates the interchange of scientific information. The third section describes the nature and diversity of the research interests and projects of those who participated in the study and the effect upon communication of the investigator's approach to and field of research, of the amount of collaborative effort in which he is engaged and of such responsibilities as the guidance and direction of research activities. In the fourth section the types of information exchange associated with the various stages in the process of research are examined and the effect of the subject matter of research and of the personal preferences of the researcher are discussed in this context. There follows a section of some seven sub-divisions which describes in detail various information exchange activities and media and attempts to assess their nature, function, and value. The concluding section presents a resume of salient findings of the study.

PB-166 471 Div. 28, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
NATURAL LANGUAGE INDEXING BY MEANS OF DATA-PROCESSING MACHINES (OBSERVATION OF THE GROWTH OF PERCEPTION PROTOCOL),
by Lewis D. Hart and George R. Bach. 11 Jun 59, 20p SP-78

Unclassified report

Presented at the Western Psychological Assn. Meeting, San Diego, 17 Apr 59.

Descriptors: (*Perception (Psychology), Psychometrics), (*Word association, Indexes), (*Group dynamics, Perception (Psychology)), Verbal behavior, Language, Vocabulary, Social psychology, Personality, Psychiatry, Data processing systems.

The study represents an attempt to provide a method for machine analysis of natural language and for indexing this language into its most meaningful elements. The basic method used is a concordance type of index that organizes each word, with the phrase around it, into a reference text. This is accomplished by data processing machines, which accept original text and, by shifting and organizing the words in the text, print a list that displays in multiple dimensions the words and additional words related to them that carry the appropriate syntax. As a by-product of the concordance operation, all of the text is in card form and lends itself to a number of statistical studies. The purpose of the study was the finding of an objective method of measuring psychotherapeutic growth by assessing various levels of individual and group perception.

PB-166 520 Div. 28, 1
OTS Prices: HC $3.00/MF $0.75

Applied Psychological Services, Wayne, Pa.
HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT. PART II. CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT. I. A REVIEW OF THE PRESENT STATE OF THE ART,
by Fred R. Brown and Arthur I. Siegel. 15 Oct 56, 88p
Contract N156s33252, Proj. TED NAM EL52004, Pt. 2
NAEC ACEL 313; AD 132 912

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cockpits, Indicator lights), (*Indicator lights, Human engineering), Display systems, Colors, Signal lights, Tables, Reviews, Naval aircraft.

The light indicators found in eighteen current Naval aircraft were examined to determine their number, location,

color, legend and/or labeling and test and dim features. A comparison was also made of the light indicators found in jet as compared with propeller-driven aircraft (a comparison which can be considered only approximate because the jets were mostly fighter aircraft, while the propeller-driven aircraft were of other operational types). The growth in the number of light indicators and changes in the proportionate use of lights for indicating various operational malfunctions is noted. In reviewing the literature and current developments in visual warning systems, a restriction to light indicators was imposed for practical reasons of scope and because of the special status of the use of lights for this purpose.

PB-166 522 Div. 28, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SIMULATION OF HUMAN THOUGHT,
by A. Newell and H. A. Simon. 28 Dec 59, 46p
RM-2506
Contract AF49 368 700
AD 235 801

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Reasoning, Simulation), (*Artificial intelligence, Digital computers), Bionics, Cybernetics, Behavior, Computer logic, Theory, Psychometrics, Decision making, Memory, Performance (Human), Programming (Computers), Computers.

This Research Memorandum describes a method of studying human problem solving, gives an example of the application of the method, and indicates the theory of problem solving that emerges. A theory of central processes is constructed in the form of a program, demonstrating the sufficiency of the theory to produce problem solving behavior by realizing it in a computer, and testing the theory against human processes by comparing the trace generated by the program with the protocol of a human subject. The application consists in a general problem solving program. The theory of human problem solving consists in a program for reasoning in terms of goals and methods for attaining those goals. The program selects paths for exploration by first determining the functions to be performed, and then finding courses of action relevant to those functions. The theory constitutes a rigorous, detailed explanation of a significant area of human symbolic behavior. (Author)

29. Quartermaster Equipment and Supplies

Patent 3,149,611 Div. 29, 16

ANIMAL WATERING NIPPLE AND BOTTLE CAP COMBINATION.
AEC-assigned Patent,
by James W. Harrison. 22 Sep 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Food dispensing), (*Food dispensing, Water), Tanks (Containers), Seals (Stoppers), Plastic seals, Stainless steel, Plastics, Pipes, Animals.

The animal-watering device includes a disposable plastic cap which is positioned over the mouth of a bottle. The cap has a central hole through which extends a stainless steel nipple. A collar associated with the nipple is also preferably made of stainless steel.

Patent 3,149,682 Div. 29

GROUND ANCHOR INSERTING DEVICE.
Army-assigned Patent,
by James M. Dunston. 22 Sep 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Anchors (Structural)), (*Anchors (Structrual), Positioning devices (Machinery)), (*Positioning devices (Machinery), Anchors (Structural)), Tents, Vehicles accessories.

The device is for use in inserting ground anchors into the ground. The anchors are for holding down tents. They are of the arrow head type. The weight of a vehicle is used to force an anchor into the ground. The anchor inserting device is clamped to the front bumper of a truck. A screw, gearing and drive element form part of the device.

Patent 3,150,985 Div. 29

DEHYDRATED FRIED MEAT CAKES.
Army-assigned Patent,
by Rosario Buscemi and Justin M. Tuomy.
29 Sep 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Dehydrated foods), (*Dehydrated foods, Meat), Frozen foods, Freeze drying, Vacuum, Vegetables, Mixtures.

Dehydrated hamburger cakes, pork sausage patties, fish cakes and the like may be prepared by the process. It may be reconstituted by hot water. The comminuted meat product is mixed with a starchy vegetable component such as corn meal. The product is prefried freeze-vacuum-dehydrated meat cake.

Patent 3,152,425 Div. 29

ROTARY CUTLERY CARRIER.
Navy-assigned Patent,
by Charles Katz and Milton E. Ryberg. 13 Oct 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Kitchen equipment and supplies), (*Kitchen equipment and supplies, Patents), Design.

The machine is for washing knives, forks and spoons. The structure includes a base upon which is mounted two rigid upright support members having a perforated cylinder carried therebetween within which various items of cutlery such as knives, forks, spoons, and the like may be placed and caused to tumble by means of a one-way drive mechanism when the apparatus is placed within the wash chamber of an automatic dishwasher.

Patent 3,152,910 Div. 29

MAKING CAKE DOUGHNUT MIXES WITH YOLK-CONTAINING EGG PRODUCTS.

Agriculture-assigned Patent,
by Takashi F. Sugihara and Leo Kline. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Food), (*Bread, Preparation), (*Eggs, Bread), Proteins, Solubility, Viscosity, Effectiveness.

The mix contains flour, sugar, shortening, skim milk solids, dried egg yolk, salt and baking powder. The main feature of the method concerns the preparation and the utilization of yolk products exhibiting moderate heat-enduced change (that is, having a protein solubility of 60 to 85 percent) whereby to secure minimum change in batter fluidity.

PB-166 288 Div. 29, 16, 20
OTS Prices: HC $4.00/MF $0.75

Office of Research Administration, Univ. of Michigan, Ann Arbor.
DETERMINATION OF RADIATION STERILIZATION DOSE FOR CANNED MEAT.
Rept. no. 13 (final), for 1 Aug 57-30 Nov 59,
by L. L. Kempe and J. T. Graikoski. Nov 59, 126p
ORA-2681-13-F
Contract DA19 129gm964, Projs. 2681, 7 84 01 002
DSSC S510 R13; AD 240 112
Unclassified report

Descriptors: (*Radiation effects, Meat), (*Clostridium botulinum, Radiation effects), (*Irradiated foods, Meat), Gamma rays, Cobalt, Spores, Bacteria, Vegetables, Purification, Containers, Preservation, Dose rate, Temperature, Intensity, Storage, Radiological dosage, Heating.

Canned ground beef containing 5,000, 000C. botulinum spores per gram were sterilized with between 3.80 and 3.85 megarad of gamma rays. Higher spore inocula would probably require higher sterilization dosages. Botulinus toxin was regularly found in irradiation-sterilized and incubated cans of ground beef inoculated with 2,670,000 or more C. botulinum 62A spores per gram. The lethality of gamma rays for C. botulinum spores was found to be slightly dependent upon both the temperature during irradiation and the intensity of the radiation field. Canned peas, inoculated with C. botulinum spores, were more easily sterilized with combined irradiation-heat processing than by either form of energy alone. (Author)

30. Research and Research Equipment

AD-282 351 Div. 30, 32
OTS Prices: HC $2.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
MACHINE LANGUAGE TRANSLATION STUDY.
Quarterly progress rept. no. 12, 1 Feb-30 Apr 62,
by W. P. Lehmann. May 62, 36p LRC-62-P12
Contract DA36 039SC78911; Grant NSF G19277
Unclassified report

Descriptors: (*Machine translation, Programming (Computers), (*Programming (Computers), Machine translation), Language, Data storage systems, Information retrieval, Punched cards, Control systems, Probability, Dictionaries, Vocabulary, Documentation, Classification, Display systems.

This report describes progress toward implementation of the USASC Language Translation System and the NSF-sponsored Linguistic Research System, in the period from 1 February 1962 to 30 April 1962. The former will be a generalized computer system for translating artificial and natural languages; the latter will be used as a tool for basic research in linguistics. The two projects are cooperating to prevent duplication of effort at this phase of the research. (Author)

AD-295 483 Div. 30, 14, 25
OTS Prices: HC $4.00/None

Gulton Industries, Inc., Metuchen, N. J.
PRESSURE MEASURING TECHNIQUES FEASIBILITY EVALUATION.
Final rept. for Jul 60-Nov 61,
by Herman Erichsen and Aaron Waldman. Dec 62,
139p
Contract AF33 616 7524, Proj. 8224, Task 822401
ASD TDR62 197
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Pressure, Transducers), (*Transducers, Pressure), Feasibility studies, Pressure gages, High temperature research, Operation, Semiconductors, Materials, Strain gages, Variable capacitors, Ceramic materials, Intermetallic compounds, Piezoelectric transducers, Indium alloys, Arsenic alloys, Antimony alloys, Silicon, Germanium, Measurement, Instrumentation.

To advance the 'state of the art' in the field of pressure transduction, the feasibility of certain advanced pressure measuring techniques was investigated. The effort was directed toward the measurement of pressure in a high temperature (1000 C) oxidizing environment such as might be encountered in advanced vehicles. The major areas of investigation centered around transduction techniques utilizing strain gauge, semiconductor (piezo-resistive and piezocapacitive), variable capacitance, variable coupling, and pyropolymer sensors. For each of these methods an analysis of design considerations including literature surveys, materials suitability, construction techniques, measuring circuitry and means of compensation is presented, where applicable. In addition, a comprehensive parametric analysis of each of the approaches, a discussion of error bands, and a summary of the probable performance of the individual systems are included. (Author)

CAPE-1086 Div. 30

Sandia Corp., Albuquerque, N. Mex.
HOT AIR CONTROL VALVE FOR THE 18 IN. HYPERSONIC WIND TUNNEL, SNAD-51.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Hypersonic windtunnels, Gate valves), (*Gate valves, Mechanical drawings), Air, Circuits, Heating, Metal seals.

Drawings(19) describe the modifications of the hot air valve used in the 18 in. hypersonic wind tunnel. This paralleled seating, gate valve with seating on the downstream face only is employed to close off the heat combustion chamber from the tunnel circuit during the heating period, seals off the high pressure hot air in the heater from the evacuated tunnel circuitry during the heat prepressurizing cycle, and provides rapid opening and closing to control the blowdown cycle. An unusual metal-to-metal seal is employed. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1117 Div. 30, 7

Brookhaven National Lab., Upton, N. Y.
TEMPERATURE CONTROL DEVICE.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Temperature sensitive elements, Control systems), (*Temperature control, Mechanical drawings), Thermostats, Transistors, Diodes, Circuits, Thermistors.

A drawing is presented for a device that provides a true proportional control of temperature. The device is extremely simple and requires a 6.3 v a-c power source. The oven used is contained in an aluminum box 1 1/2 in. x 2 in. x 3 in. with styrofoam used as an insulation. The nichrome heater is protected by a 1/16 in. copper isothermal shield. There are control and monitor thermistors. Oven and circuit drawings are available. The circuit is active during those supply voltage alternations in which the upper bus is negative. Temperature error produces a small unbalance in the bridge consisting of 3 resistors and the control thermistor. The bridge delivers input to a 4 stage direct-coupled amplifier which employs cascaded transistors of alternated polarity. The collector current of each transistor is of the proper polarity to forward bias the base-emitter junction of the next. The output stage is a peak-reading emitter follower which supplies filtered d-c to the heater. A 5.1 v Zener diode clips the applied voltage to a constant level. This diode is used as a precise voltage reference. This control device was tested for a week; the temperature did not drift more than 0.01C from the preset value of approximately 50C. The room temperature varied over a range of 5F. For a listing of this title, see the Engineering Materials List (TID-4100). (AEC Abstract)

CAPE-1123 Div. 30

Oak Ridge Inst. of Nuclear Studies, Tenn.
ORINS MEDICAL IRRADIATION FACILITY.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Nuclear physics laboratories, Mechanical drawings), Medical laboratories, Nuclear particles, Shielding.

Nineteen drawings are included that describe several irradiation rooms including shielding. The facilities discussed include: the radiation storage vault, which contains 256 compartments for the storage of small quantities of radioactive materials; the telecobalt therapy building addition, which consists of a treatment room 14 ft x 24 ft and a control room 14 ft x 8 ft 7 5/8 in.; and the total body irradiator room, which contains 8 cesium-137 sources. The facility is constructed of poured concrete. (AEC abstract)

Patent 3,144,775 Div. 30,12

ARM HOLDING AND EXTENDING MEANS.
Navy-assigned Patent,
by Robert K. Chaimson. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Extendable structures), (*Extendable structures, Supports), (*Supports, Satellite antennas), Locking fastener devices, Automatic.

The mechanism is for extending an arm a specific distance and automatically locking the arm in place. The arm is adapted to be extended into an extended position along guide rails. The arm is mounted on a support frame, a base, or in a housing which includes a bottom and end supports. The apparatus can be sued for extending an antenna from a satellite.

Patent 3,151,321 Div. 30

DIGITAL ENCODER.
Navy-assigned Patent,
by Charles L. Bossard. 29 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Input-output devices), (*Input-output devices, Digital systems), Programming (Computers), Special purpose computers.

The linear position encoder converts or changes the position of a shaft directly into a digital code without any intermediate steps. The system eliminates the necessity for an analog-to-digital converter because the position information is converted directly into a digital form and not first to an analog form.

Patent 3,152,451 Div. 30

CONTROL SYSTEM.
Navy-assigned Patent,
by Thomas E. Downs. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Temperature control), (*Temperature control, Heating elements), Control systems, Temperature sensitive elements, Thermoelectricity, Switching circuits, Signal generators, Gates (Circuits).

The control system is for use with a thermoelectric element which can be used to heat or cool an area such as the space where crystals in a transmitter are mounted. The system includes a detector, switching elements, two signal generators and gating elements which gate signals from an energy source.

Patent 3,152,475 Div. 30

HIGH PRESSURE GAS MOISTURE INDICATOR.
Navy-assigned Patent,
by Stephen H. Ford, Jr. and John W. Cadorette.
13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hygrometers), (*Hygrometers, Patents), (*Gases, Hygrometers), Instrumentation, High pressure research, Dew point, Pressure.

The instrument indicates the moisture content and/or the dew point of gases under high pressure. The device makes use of a vortex tube, or Hilsch tube, in combination with a regenerative heat exchanger and a sampling heat exchanger as its basic elements.

Patent 3,153,141 Div. 30

RECORDER CHART ANALYZER.
Navy-assigned Patent,
by Harold R. Ahrens. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pattern recognition), (*Pattern recognition, Maps), (*Maps, Pattern recognition), Geometric forms, Automatic, Data processing systems, Time.

The system automatically analyzes data recorded graphically on strip charts and produces an output which may be employed in conjunction with various computer apparatus or other readout equipment. The data analyzer replots data with compression or expansion of the time scale.

Patent 3,153,152 Div. 30, 8

VARIABLE LIMITER FOR ANALOG COMPUTER USING A FIXED ZENER DIODE.
Navy-assigned Patent,
by Henry C. Hoffman, Jr. 13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Limiters), (*Limiters, Analog computers), (*Analog computers, Limiters), Amplifiers, Feedback amplifiers, Electrical impedance, Potentiometers, Feedback, Diodes.

The limiter circuit for an analog computer includes a high gain operational amplifier, an external feedback for the amplifier, an input impedance including a potentiometer connected to the amplifier and a double Zener diode connected between the potentiometer and ground.

Patent Design 199,342 Div. 30

DISPLAY STAND.
Army-assigned Patent,
by Isiah D. Durham. 6 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Display systems, Patents), (*Patents, Supports), (*Supports, Display systems), Laminates, Geometric forms, Surfaces, Visibility.

The display stand is made of two thin oval elements adhered to each other so that only the lower portion of one oval is visible while the entire surface of the upper oval element is visible. The device is supported by four legs.

PB-166 423 Div. 30
OTS Prices: HC $3.00/MF $0.75

New York Univ., N. Y. Coll. of Engineering.
ANALYSIS OF QUANTIZED TWO-DIMENSIONAL GEOMETRIC PATTERNS,
by Jeremy M. Glass. 28 Sep 61, 62p NYU-TN-400-7
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Statistical analysis, Geometric forms), (*Geometric forms, Statistical analysis), (*Pattern recognition, Statistical processes), Curved profiles, Curve fitting, Probability, Statistical functions, Mathematical models, Signals, Noise, Input-output devices.

The quantization of two-dimensional plane curves is examined when the curves are members of an ensemble which can be described by a probability density distribution. A quantizer is seen to act on the probability density distriubtion of the input ensemble to give a probability density distribution which characterizes the quantized output ensemble. Under certain conditions, quantizer action produces independent, additive uniformly distributed noise. Several methods of quantizing are examined, and a block diagram model for square box quantizing is developed. (Author)

PB-166 426 Div. 30
OTS Prices: HC $1.00/MF $0.50

Bell Telephone Labs., Inc., Murray Hill, N. J.
AN ANALOG METHOD FOR CHARACTER RECOGNITION,
by W. H. Highleyman. 8 Dec 60, 12p
Unclassified report

Pub. in IRE Transactions on Electronic Computers, 1961, v. EC-10, no. 3.

Descriptors: (*Character recognition, Analog systems), (*Analog systems, Character recognition), Pattern recognition, Correlation techniques, Statistical functions, Reading machines, Optical equipment, Simulation, Digital computers, Information retrieval.

A method for character recognition which is capable of an analog implementation has been studied by simulation on a digital computer. In essence, this method involves maximizing the cross-correlation value between the unknown character and a set of average characters, there being one average character for each allowed character class. An average character is represented by a two-dimensional function. The value of this function at a point is the probability of occurrence of a mark at that point for the character class represented by the average character. Negative weights are given to areas of low probability in each average character to improve discriminability. The simulation results indicate that this method is applicable to the recognition of machine printing, and perhaps to the recognition of constrained hand printing. The method can be implemented in an economical manner using electro-optical techniques. (Author)

PB-166 432 Div. 30
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
AUTOMATIC INPUT FOR BUSINESS DATA PROCESSING SYSTEMS,
by K. R. Eldredge, F. J. Kamphoefner, and P. H. Wendt.
30 Oct 56, 14p
Unclassified report

Paper from Eastern Joint Computer Conference, 1956. Proceedings, spec. publ no. T-92.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Input-output devices, Data processing systems), (*Data processing systems, Input-output devices), (*Pattern recognition, Magnetic materials), Reading machines, Commerce, Ink, Banking, Printing, Electromechanical converters, Paper, Handling, Computers, Automatic.

The techniques developed at SRI permit the entry of information into a computer directly from business documents in the form of conventional numbers and symbols printed in magnetic ink. Machine reading can be accomplished at rates exceeding 5000 characters per second, and the paper documents themselves have been handled at rates exceeding 50 per second. Most of the work in these techniques has been aimed at developing a check handling system for banks but the same techniques are readily adaptable to other business applications such as charge tickets, payroll systems, and cost accounting of all types. Work on the computer input system which has been developed may be conveniently divided into three categories. The first consists of the development of techniques for the reliable machine reading of characters and symbols printed in magnetic ink. The second is the development of a series of magnetic inks suitable for character reading and at the same time compatible with a wide range of printing methods and practices. The third category is in the area of development of electro-mechanical machinery which is capable of reliably handling individual pieces of paper of varying sizes, weights and degrees of mutilation.

PB-166 433 Div. 30
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
AN APPROACH TO A DISTRIBUTED MEMORY,
by C. A. Rosen. 1960, 18p
Unclassified report

Pub. in Proceedings of Symposium on the Principles of Self-Organizing Machines, Illinois Univ., 9 Jun 60, n. p., n. d., p. 425-442.

Descriptors: (*Computer storage devices, Theory), Digital computers, Wiring diagrams, Training devices, Reading machines, Iterative methods.

Premised on the use of multistage storage elements, a class of wiring schemes is introduced for a distributed memory which appears useful and conceptually illuminating. Interaction schemes, methods of read-in and read-out are described, as applied to small systems. (Author)

PB-166 435 Div. 30
OTS Prices: HC $1.00/MF $0.50

Swarthmore Coll., Pa.
A SCHEME FOR RECOGNIZING PATTERNS FROM AN UNSPECIFIED CLASS.
Progress rept.,
by Carl Barus. 1962, 22p
Unclassified report

Pub. in Optical Character Recognition, Washington, 1962, p. 227-248.
This paper was prepared as a progress rept. to the National Science Foundation, which is supporting this work.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Pattern recognition, Correlation techniques), (*Artificial intelligence, Input-output devices), Character recognition, Reading machines, Computers, Training, Computer logic, Information retrieval.

A pattern recognition scheme is composed, and mathematically derived, under which the machine's information about a pattern resides in a small, stored subset of specimens of the pattern. The membership of each subset changes, during a learning phase, so that it becomes typical of the pattern it represents. A measure of similarity or nearness between an unknown and a subset is developed, which measure emphasizes the contributions of the most similar measures. Discussion is restricted to a binary measurement vector in which each component is thought of as a cell in a binary grid. Experiments were performed in which two-dimensional signals were hand-drawn on a grid from which punched cards were made by punching through the active grid cells. The unnormalized correlations between a pair of symbols was obtained by counting holes common to the two cards. The results with their proposed method of categorizing are not significantly better than those using correlation with reference symbols obtained by averaging over each stored subset. Even so, the method distinguishes reasonably well between patterns as similar as hand-drawn 'circles' and 'squares.' More storage and learning would be needed to distinguish among hand-drawn 'O', 'Q', and 'C'.

PB-166 437 Div. 30
OTS Prices: HC $1.00/MF $0.50

Miller Research Inst., Calif. Univ., Berkeley.
ELECTRONIC ANALOG OF THE HUMAN RECOGNITION SYSTEM,
by J. R. Singer. 1961, 10p
Unclassified report

Pub. in Journal of the Optical Society of America, v.51, no. 1, p. 61-69.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Pattern recognition, Computer logic), (*Artifical intelligence, Analog systems), Models (Simulations), Fiber optics, Photoreceptors, Humans, Delay lines, Photochemistry, Optical images, Differentiating circuits, Reading machines, Transformers.

This article describes a system for pattern recognition made up of electronic logic elements which has many of the characteristics of humans for recognizing patterns. In particular, the recognition is invariant for size and will tolerate a specified amount of tilt or figure rotation. The electronic components or organs which make up this system consist of delay lines, logical elements such as 'and' circuits, and photoreceptors. (Author)

PB-166 439 Div. 30, 8, 16
OTS Prices: HC $1.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
INFORMATION THEORY AND THE HUMAN VISUAL SYSTEM,
by J. R. Singer. Sep 58, 1p
Unclassified report

Pub. in Journal of the Optical Society of America, vol. 49, no. 6, p. 639-640, Jun 59.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Vision, Communication theory), (*Communication theory, Vision), Digital computers, Input-output devices, Circuits, Phototubes, Retina, Optic nerve, Preception.

The paper views the human visual system within the frame of reference of a digital computer. In this treatment, the input system is considered as the analog to the retina and the optic nerve. It is concluded (1) that it is plausible to believe that the neural interconnections are analogous to differentiating circuits such as photocell bridges, (2) that the input circuit (which includes the retina and the optic nerve) is capable of transmitting data at an enormously greater rate than the brain is capable of processing this data. That is, the recognition procedure for reading or other visual tasks is not limited by the

retina or optic nerve, but is limited by the time of processing which is the function of the brain. (Extracted)

PB-166 450 Div. 30
OTS Prices: HC $1.00/MF $0.50

Lockheed Missiles and Space Co., Palo Alto, Calif.
HYPERPLANE TECHNIQUES IN PATTERN RECOGNITION,
by Martin A. Fischler. 23 Nov 62, 3p
Unclassified report

Pub. in proceedings of the IEEE, 1963, v. 51, no. 3, p. 497-498.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pattern recognition, Functional analysis), Set theory, Decision theory, Correlation techniques, Artificial intelligence.

Two general approaches to the pattern recognition problem are discussed: the 'linear decision' approach and the 'correlation' approach. The interrelation of the approaches is examined first, and then a technique which combines the best features of each is offered.

PB-166 453 Div. 30
OTS Prices: HC $1.00/MF $0.50

Bell Telephone Labs., Inc., Murray Hill, N. J.
COMMENTS ON A CHARACTER RECOGNITION METHOD OF BLEDSOE AND BROWNING,
by W. H. Highleyman and L. A. Kamentsky. 11 Apr 60, 1p
Unclassified report

Pub. in IRE Transactions on Electronic Computers, 1960, v. EC-9, no. 2.

Descriptors: (*Character recognition, Correlation techniques), Optical scanning, Pattern recognition, Printing, Reading machines, Computer logic, Digital computers, Artificial intelligence.

A method of Bledsoe and Browning for character recognition was tested at the Bell Telephone Laboratories, using the Generalized Scanner as an input transducer and the IBM 704 to simulate the recognition logic. The recognition of both hand block printing and machine printing was studied.

PB-166 454 Div. 30
OTS Prices: HC $1.00/MF $0.50

Panoramic Research, Inc., Palo Alto, Calif.
IMPROVED MEMORY MATRICES FOR THE n-TUPLE PATTERN RECOGNITION METHOD,
by W. W. Bledsoe, and C. L. Bisson. 2 Jul 61, 2p
Unclassified report

Pub. in IRE TRANS., 1962, v. EC-11, June, p. 414-415.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pattern recognition, Matrix algebra), (*Artificial intelligence, Pattern recognition), Reading machines, Learning, Computer storage devices, Set theory, Character recognition, Information retrieval.

It is shown that a previous version of the n-tuple pattern recognition method can be made more effective by making certain changes in the learning phase. A means of further increasing readability through judicious choice of n-tuples is described.

PB-166 455 Div. 30
OTS Prices: HC $1.00/MF $0.50

Sandia Corp., Albuquerque, N. Mex.
STOCHASTIC MODEL FOR THE BROWNING-BLEDSOE PATTERN RECOGNITION SCHEME.
Revised ed.
by G. P. Steck. May 62, 12p SCR-521
Unclassified report

Revision of 20 Apr 61. Sponsored by the Atomic Energy Commission.
Pub. in IRE Transactions on Electronic Computers, 1962, April, p. 274-282.

Descriptors: (*Pattern recognition, Stochastic processes), (*Stochastic processes, Pattern recognition), Artificial intelligence, Character recognition, Probability, Functions, Mathematical models, Communication theory.

A stochastic model is presented which gives the probabilities of successful recognition of the Browning-Bledsoe recognition scheme as a function of scheme parameters and pattern variability parameters. Also, procedures are given for estimating the variability parameters from data so that the model can be used to predict readability. The adequacy of the model is checked by comparing estimated readability with observed readability for two sets of data, one with high variability and one with low variability. The Browning-Bledsoe recognition scheme is also treated as a coding and decoding problem in which case the concepts of information theory are useful. Finally, brief mention is made of the connection between pattern recognition problems and classification problems in general, and the Browning-Bledsoe recognition scheme is compared and contrasted with other recognition schemes which make use of measurements on patterns.

PB-166 456 Div. 30
OTS Prices: HC $1.00/MF $0.50

PhilcoCorp., Blue Bell, Pa.
THE 'WHIRLING DERVISH,' A SIMULATION STUDY IN LEARNING AND RECOGNITION SYSTEMS,
by Allen Hoffman. 1962 , 9p
Unclassified report

Pub. in IRE Convention Record, 1962, pt. 4, p. 153-160.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Reading machines, Pattern recognition), (*Pattern recognition, Reading machines), (*Artificial intelligence, Reading machines), Punched tape, Input-output devices, Optical equipment, Correlation techniques, Simulation, Digital computers, Computer logic, Data processing systems.

An optical correlation device is described. Its function is to generate correlation data between two dimensional patterns and random line templates. The output of the device is paper tape containing the correlation data and sufficient flagging and sync. information to facilitate digital computer processing. The use of this device in conjunction with digital computer is discussed as a simulation procedure for the evaluation and design of recognition systems. (Author)

PB-166 457 Div. 30
OTS Prices: HC $1.00/MF $0.50

SCOPE, Inc., Falls Church, Va.
CONFLEX I, A CONDITIONED REFLEX SYSTEM,
by Malcolm R. Uffelman. 1962, 11p
Unclassified report

Work sponsored by U. S. Air Force.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Pattern recognition, Computer logic), (*Artificial intelligence, Programming (Computers)), Probability, Input-output devices, Special purpose computers, Data storage systems, Digital systems, Equations, Reading machines.

The functional organization of a conditioned-reflex system (CR System) is presented. This general system is then analyzed by means of probability theory and design equations are derived. Finally, the logical design and operational capabilities of a special purpose digital system, called CONFLEX I, which implements the concept is described. (Author)

PB-166 464 Div. 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
COMPLEX SEARCH PROCESSES IN AUTOMATA AND MAN-AUTOMATA COMBINATIONS,
by George P. DeFlorio. 1 Jun 62, 8p SP-842
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Artificial intelligence, Computers), (*Computers, Search theory), Information retrieval, Pattern recognition, Programming (Computers), Communication theory, Data processing systems, Bionics, Automation, Graphics, Display systems.

Two central problems in artificial intelligence and advanced man-machine computer applications are explored. These are: (1) typist: continue with the rest of the Introduction, p. 1, beginning with line 2, 'the machine realization ...' and ending with 'Research Laboratory (SSRL).'

PB-166 469 Div. 30
OTS Prices: HC $3.00/MF $0.50

System Development Corp., Santa Monica, Calif.
INTRODUCTION TO ROVER, AN INFORMATION PROCESSOR,
Field note,
by Aiko M. Hormann. 25 Apr 60, 51p FN-3487
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Programming languages, Information retrieval), (*Information retrieval, Programming languages), Programming (Computers), Digital computers, Computer storage devices, Control sequences, Search theory, Computer logic.

ROVER is the name given to a particular system which may be thought of either as a specially designed computer or as a higher-level programming language for information processing. The name 'ROVER' is used in these senses interchangeably. This note is written for a mixed group of readers: non-programmers and programmers for digital computers. Most of the detailed explanations and examples are found in the appendixes.

PB-166 474 Div. 30
OTS Prices: HC $3.00/MF $0.75

System Development Corp., Santa Monica, Calif.
PROGRAMS FOR MACHINE LEARNING,
by Aiko M. Hormann. 29 May 62, 75p
TM-669/000/01
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Artificial intelligence, Programming (Computers)), (*Programming (Computers), Artificial intelligence), Feedback, Communication theory, Design.

The paper reports on a proposed schema and gives some detailed specifications for constructing a learning system by means of programming a computer. An attempt was made to separate learning processes and problem-solving techniques from specific problem content. Programs in the system are given by the programmer either directly or indirectly. Indirectly given programs are those which are constructed inside the system (by a set of programs constituting a program-providing mechanism) from an existing supply of basic instructions and component programs, some of which have been directly given and some of which may have been previously constructed by the system itself. The primary purpose of indirect programming is to assist higher-level programs in performing tasks for which detailed preplanning by an external programmer is either impossible or impractical. To manage classes of problems and to make efficient use of past experience, an induction mechanism is proposed. An illustration is given of the induction mechanism solving a specific sequence of tasks.

PB-166 479 Div. 30, 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GENERALIZATION OF AN ELEMENTARY PERCEIVING AND MEMORIZING MACHINE,
by E. A. Feigenbaum and H. A. Simon. Mar 62, 17p
P-2555
Unclassified report

Prepared for presentation at the 1962 Congress of the International Federation of Information Processing Societies (IFIPS), Munich, Aug 62.

Descriptors: (*Artificial intelligence, Verbal behavior), (*Verbal behavior, Artificial intelligence), (*Learning, Artificial intelligence), Bionics, Digital computers, Memory, Word association, Images, Humans, Behavior, Simulation, Input-output devices.

The Elementary Perceiver and Memorizer (EPAM) is a computer model of human associative memory and the processes of verbal learning. In this model, EPAM information processes and structures have been generalized to deal with stimulus objects of arbitrary complexity. Discrimination processes discriminate objects on the basis of properties of the objects themselves or on the basis of properties of constituent subobjects. The cue-token is an associative link between the references to an object and the image of that object stored in the association memory. The learning processes of EPAM III provide an associative mechanism by means of which earlier learning can be brought to bear in a useful way on later learning. Exploration of the EPAM III model is concerned with simulating the behavior observed in psychological experiments on meaningfulness in verbal learning.

PB-166 480 Div. 30
OTS Prices: HC $1.00/MF $0.50

Michigan Univ., Ann Arbor.
ITERATIVE CIRCUIT COMPUTERS,
by John H. Holland. 1959, 7p

Contract DA36 039SC78057; Grant NSF G4790
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Computers, Modules (Electronic), Control sequences, Computer logic, Circuits, Iterative methods, Adaptive control systems.

The paper first discusses an example of a computer, intended as a prototype of a practical computer, having an iterative structure and capable of processing arbitrarily many words of stored data at the same time, each by a different sub-program if desired. Next a mathematical characterization is given of a broad class of computers satisfying the conditions just stated. Finally the characterization is related to a program aimed at establishing a theory of adaptive systems via the concept of automaton generators.

PB-166 481 Div. 30
OTS Prices: HC $1.00/MF $0.50

Mental Health Research Inst., Univ. of Michigan, Ann Arbor.
A PATTERN RECOGNITION PROGRAM THAT GENERATES, EVALUATES AND ADJUSTS ITS OWN OPERATORS,
by Leonard Uhr and Charles Vossler. Apr 61, 20p
Unclassified report

Prepared for presentation at the Western Joint Computer Conference, Los Angeles, Calif., May 61. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pattern recognition, Operators (Mathematics)), (*Artificial intelligence, Pattern recognition), Reading machines, Adaptive control systems, Learning, Computer storage devices, Feedback, Matrix algebra, Character recognition.

This paper describes an attempt to make use of machine learning or self-organizing processes in the design of a pattern-recognition program. The program starts not only without any knowledge of specific patterns to be input, but also without any operators for processing inputs. Operators are generated and refined by the program itself as a function of the problem space and of its own successes and failures in dealing with the problem space. Not only does the program learn information about different patterns, it also learns or constructs, in part at least, a secondary code appropriate for the analysis of the particular set of patterns input to it.

PB-166 482 Div. 30, 28
OTS Prices: HC $1.00/MF $0.50

Experimental Programming Unit, Edinburgh (Scotland).
TRIAL AND ERROR,
by Donald Michie. 1961, 17p
Unclassified report

Pub. in Penguin Science Survey, 1961, no. 2, p. 129-145. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Artificial intelligence, Learning), (*Learning, Artificial intelligence), Input-output devices, Bionics, Cybernetics, Game theory.

The nature of learning and the possibility of simulating it mechanically are discussed.

PB-166 483 Div. 30, 32
OTS Prices: HC $2.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
DEVELOPMENT OF A LINGUISTIC COMPUTER SYSTEM,
Rept. no. 21 (Quarterly progress rept. no. 5)
1 May-31 Jul 64,
by W. P. Lehmann and E. D. Pendergraft.
Aug 64, 33p LRC-64-P21
Grant NSF GN208
Unclassified report

See also PB-163 840.

Descriptors: (*Machine translation, Computers), (*Computers, Machine translation), Language, Programming (Computers), Character recognition.

Progress is reported in the development of two generalized computer systems: the first designed to implement automatic translation of languages, the second to support basic research in linguistics. The systems complement each other in that basic programs prepared for each are applicable to, and needed in, the other. The common system design contains three sections: one for control, a second for language data processing and a third for linguistic information processing. The first two sections are now operational. In the third, Monolingual Recognition programs for performing lexical and syntactic analysis and display have been made operational. Development of the computer system programs continues, with special attention being given to those programs which implement syntactic translation. The completed programs are being used to verify English, German, Russian, and Chinese syntactic data.

PB-181 569 Div. 30
OTS Prices: HC $1.25/MF $0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Dec 64
Unclassified report

Descriptors: (*Scientific research, Naval Research), (*Naval research, Reports), Ceramic materials, Electrical impedance, Chemistry, Alkali metals, Gas analysis, Metallurgy, Alloys, Mechanical properties, Refractory metals, Oxidation, Steel, Nuclear reactors, Pressure vessels, Fatigue (Mechanics), Nuclear physics, Electron guns, Radio equipment, Clocks, Networks, Antennas, Solid state physics, Crystal lattices, Color centers, Luminescence, Fluorescence.

Contents:
Articles: High Field Losses in Piezoelectric Ceramics, P. Smith and A. Burbage
The Effects of Technique on the Reliability of Mechanical Impedance Measurement, G. M. Remmers and R. O. Belsheim
Scientific Program:
Chemistry: High temperature properties of sodium, potassium, and cesium. Analysis of gas identification training sets of the E17 series
Metallurgy: Effect of processing on the strength and fracture toughness properties of a Ti-7Al-2Cb-1Ta Alloy. Niobium bicrystals. Diffusion in columbium-titanium alloys. Metallographic study of fatigue damage. Influence of test conditions on the behavior of refractory metals. Break-away oxidation of molten Sn-Al alloys. Oxidation of Fe-Cr alloys in CO2-CO mixtures. Radiation effects to uranium-bearing steels. Yankee reactor pressure vessel surveillance: Transition temperature increase and neutron dosimetry for core. Low cycle fatigue crack propagation characteristics of Monel 400 and Monel 'K' 500 alloys

Nuclear and Atomic Physics: A 2-in. beam valve for an electron gun cathode
Radio: Doubly redundant digital clock. The calculation of frequency modulation distortion in linear networks.
(For rest of abstract see USGRDR, v. 40, no. 3)

31. Ships and Marine Equipment

Patent 3,146,750 Div. 31

SUBMARINE RESCUE APPARATUS.
Navy-assigned Patent,
by Raymond B. Ebbets, Frederick H. Hallett, and Harlan Turner, Jr. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Sea rescue equipment), (*Sea rescue equipment, Submarines), Cable assemblies, Check valves, Compressed air, Hose fittings, Hoses, Inflatable structures.

A method and apparatus are provided for raising from the deck of a bottomed or disabled submarine to the surface of the water the downhaul cable for a submarine rescue chamber. The apparatus is for the rescue of men from deep diving submarines. The messenger buoy includes a collapsible bag, a compressed air hose, a check valve and a mechanical link for anchoring the bag and operable to rupture the bag when the bag is inflated to a predetermined volume.

Patent 3,150,347 Div. 31

UNDERWATER TRANSDUCER ELEMENT.
Navy-assigned Patent,
by Sam Hanish. 22 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Transducers), (*Transducers, Underwater equipment), Instrumentation.

The transducer is adaptable to a variety of underwater applications. The element comprises a pair of bender discs disposed to operate in bender resonance. The bender discs in each transducer element are mounted in opposition on a central pin to provide a high efficient bilateral response. In addition, a pressure control feature is incorporated to permit the use of the elements at extreme depths.

Patent 3,152,344 Div. 31

LIFE PRESERVER.
NASA-assigned Patent,
by Matthew I. Radnofsky and Glenn A. Shewmake.
13 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Life preservers), (*Life preservers, Inflatable structures), Marine safety equipment, Nylon, Textiles, Carbon dioxide, Structural parts, Pilots, Astronauts.

The inflatable life preserver is for use by pilots and astronauts. It is made of nylon fabrics and is inflated by a CO2 cartridge. The structure includes internal members which cause the life preserver, when inflated, to assume a 'ram's horns' configuration.

32. Miscellaneous Arts and Sciences

AD-404 812 Div. 32, 30
OTS Prices: HC $1.00/None

Applied Physics Lab., JHU, Silver Spring, Md.
THE APPLICATION OF THE IBM 1401 COMPUTER TO THE APL STORAGE AND INFORMATION RETRIEVAL SYSTEM,
by Fenton L. Kennedy. 8 Feb 63, 13p
APL/JHU-CF-3022
Contract NOw62 0604c
Unclassified report

Descriptors: (*Information retrieval, Computers), (*Computers, Information retrieval), Documentation, Catalogs, Reports, Libraries, Programming (Computers), Search theory, Digital computers.

The IBM 1401 was studied as a small computer, regarding its cost, efficiency, and flexibility in programming and operating an information retrieval system. The system at the Applied Physics Laboratory has 2 parts: (1) library cataloging procedure, including preparation of documents for entering the bibliographic material and cataloging onto the library master tape and its subsequent retrieval (the descriptors being developed from the documents as they are cataloged), and (2) the phrasing of the inquiry for the computer, using the Polish Prefix Notation, so that the search program will result in a final printout to be supplied to the technical user. Descriptors are of three kinds: (1) assigning one meaning only, when desirable, and abbreviating or condensing words as 'high' to 'hi', (2) using two words as a single descriptor, (3) using the machine method Magnitude Operator Equal which combines descriptors on an equal basis. The library master tape at APL stores information related to 1500 documents. The system on the 1401 is regarded as flexible enough to be used for personnel records, inventory, and hospital records.

Patent 3,153,399 Div. 32, 16

ANIMAL HEAD RESTRAINER.
Army-assigned Patent,
by William S. Koon. 20 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Laboratory equipment), (*Laboratory animals, Stabilization systems), (*Laboratory equipment, Medical research), Design, Rings, Rotation, Head.

The animal head restrainer holds the head of an animal in a fixed position in laboratory experiments. It may also be used in dehorning cattle. The device fits around the neck of an animal. It is made of a plurality of stepped circular ring sections arranged to be rotated so that the size of a central opening is variable to fit different neck sizes.

PB-166 412 Div. 32, 30
OTS Prices: HC $3.00/MF $0.50

American Meteorological Society, Washington, D. C.
MECHANIZATION OF THE UDC: PILOT PROJECT TO FURTHER EXPLORE POSSIBILITIES FOR MECHANIZATION OF UNIVERSAL DECIMAL CLASSIFICATION (UDC) SCHEDULES.
Final rept.,
by Malcolm Rigby. 3 Jun 64, 57p
Grant NSF GN131

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Classification, Feasibility studies), (*Data processing systems, Operation), Information retrieval, Data storage systems, Language, Punched cards, Programming (Computers), Scheduling, Costs, Input-output devices.

A pilot project for the purpose of determining the feasibility, costs and problems involved in mechanical storage, retrieval and printout of UDC schedules in any or all languages, especially in the three official languages (English, French and German) is described. The factors considered were: 1) the procurement of schedules, 2) preparation of copy for punching (including transliteration of Russian and Romanization of Japanese characters), 3) punching and verifying cards, 4) editing (proof) computer run, 5) correcting card file, 6) taping cards, 7) programming for single language, for multilingual presentations and for updating, 8) final computer runs for study or reproduction, 9) reproduction problems, 10) cost analysis for limited sample, for a larger sample or for entire body of UDC schedules, including extensions and corrections.

PB-166 413 Div. 32, 2, 30
OTS Prices: HC $4.00/MF $1.00

American Meteorological Society, Washington, D. C.
AMERICAN METEOROLOGICAL SOCIETY EXPERIMENTAL COMPUTER SYSTEM FOR PRODUCING U. D. C. SCHEDULES. APPENDIX II-VII, IX.
System progress rept.
Dec 63, 148p
Grant NSF GN131

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Classification, Automatic), (*Digital computers, Experimental data), (*Documentation, Meteorology), Programming (Computers), Punched cards, Magnetic tape, Data processing systems, Language, Data, Handling, Costs, Astrophysics, Geophysics, Feasibility studies, Scheduling.

C-E-I-R, INC. developed a pilot computer program early in 1963 for the American Meteorological Society which demonstrated the ability to produce UDC schedules by means of a computer generated printout. This program produced an English, French and German Tri-lingual Schedule in March of 1963. Based on this pilot program AMS asked C-E-I-R, INC. to develop a system which would provide for maintenance of a master file of UDC schedules as well as the ability to print UDC schedules in any of several formats. The chief requirements of this system have been, a flexibility in the handling of data within the system and computer programs so written that modification during current development and in the future could be accomplished with minimum cost and effort. This report concerns itself with describing the capabilities of this system as it now exists and, outlining necessary extensions of the system in order that it may perform all the functions originally intended.

PB-166 415 Div. 32
OTS Prices: HC $3.00/MF $0.50

Little (Arthur D.), Inc., Cambridge, Mass.
CENTRALIZATION AND DOCUMENTATION.
Final rept. Second ed.
Jun 64, 53p ALI-C-64469

Unclassified report

Descriptors: (*Information retrieval, Mathematical models), (*Documentation, Information retrieval), Storage, Scientific research, Data storage systems, Programming (Computers), Search theory, Indexes, Subject indexing, Vocabulary, Costs, Equations.

The feasibility of centralizing facilities for the storage and retrieval of scientific documents was considered. The main objective was to furnish operational analyses which can provide a basis for formulating government policy on centralization of such facilities. A secondary objective was to provide insight into technical developments which may affect the feasibility of centralization in the future, and to suggest courses of action which might lead to significantly enhanced capabilities for storage and retrieval in a predictable number of years. The following question was considered: 'With the objective of detecting potential duplication of research and technical effort, is it desirable to encourage the establishment of very large-scale document centers, which would store and index by subject content large portions of current scientific literature, for mechanized retrieval on demand.' To answer this question, an analysis was made of the feasibility of applying existing information retrieval technology to the design of special-purpose information establishments which would contain at least several hundred thousand documents in highly specific areas of science or technology, and enable a user to conduct exhaustive literature searches. If a centralized facility of this type were to be implemented immediately, it would have to use some form of mechanized system for searching document references. Therefore, a mathematical model of a coordinate indexing system was developed by which evaluation could be made of: (1) the expected number of documents to be retrieved as a consequence of different types of searches; (2) the expected recall and precision ratios, which are measures of system performance; and (3) the expected search effort required.

PB-166 416 Div. 32, 30
OTS Prices: HC $3.00/MF $0.75

Centre National de la Recherche Scientifique, Paris (France).
PROGRAMME DE RECHERCHE AUTOMATIQUE DES INFORMATIONS POUR L'ANALYSE DE CONTENU (SUR GAMMA 60 BULL),
by M. Renaud. 1964 69p

Unclassified report

Report in French.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Automatic), Language, Programming (Computers), Punched cards, Tables, Computers, France.

PB-166 418 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Documentation, Inc., Bethesda, Md.
AUTOMATIC DICTIONARIES FOR MACHINE TRANSLATION,
by M. Taube and L. B. Heilprin. 11 Apr 57, 2p

Unclassified report

Pub. in the Proceedings of the IRE, v. 45, no. 7.
Legibility of this document is in part unsatisfactory.

Reproduction has been made from best available copy.

Descriptors: (*Dictionaries, Machine translation), (*Machine translation, Dictionaries), (*Data storage systems, Information retrieval), Language, Documentation, Automatic, Vocabulary.

The parallel or simultaneous search method is discussed as a time-saving search procedure. Parallel scanning of a large word-collection can be achieved by scanning a class or classes of which the word sought is a member. Several systems for isolating class members were developed in which access to an item can be had through a number of starting points. Word-for-word translation is also discussed.

PB-166 419 Div. 32
OTS Prices: HC $2.00/MF $0.50

Compagnie de Saint-Gobain, Paris (France).
UNE EXPERIENCE DE SELECTION AUTOMATIQUE DE DOCUMENTATION,
by F. Levery, F. Biet, B. Reibell, R. Cohendet, and G. Picot. Dec 60, 49p
Unclassified report

Report in French. Rept. prepared with the cooperation of Compagnie IBM (France).

Descriptors: (*Information retrieval, Automatic), (*Documentation, France), Chemistry, Records.

Endeavors are described of attempts to establish an automatic system for retrieval of chemical information during bibliographic search by the Compagnie de Saint-Gobain. The system had been based previously on an alphanumeric hierarchical classification scheme suitable for the company and containing 637 subdivisions. The Compagnie de Saint-Gobain was assisted by the Compagnie IBM France in three stages of endeavor: theoretical determination of the method to be used for retrieval; formation of records for application in search and a search program for use on an IBM 705; and verification of the validity of the system by automatic treatment of search requests. In the derivation of the individual terms for indexing the documents, consideration had to be given to syntax, synonymy, and hierachy. The results obtained from the automatic retrieval were encouraging.

PB-166 420 Div. 32
OTS Prices: HC $2.00/MF $0.50

Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
STUDY OF THEORIES AND MODELS OF INFORMATION STORAGE AND RETRIEVAL: THE STRUCTURE OF DOCUMENT RELATIONS.
Rept. no. 8,
by Donald J. Hillman. 25 Aug 64, 32p
Grant NSF GN283
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Mathematical logic), (*Mathematical logic, Information retrieval), Model theory, Search theory, Operations research, Topology, Metamathematics, Documentation, Subject indexing, Theorems, Graphics.

A theory is proposed for articulating the relationships between documents via the relationships holding between the terms used to characterize the documents. A basic predicate of connectedness is introduced, in terms of which term-term and term-document relationships are describable. Properties of connectedness are set forth in a number of theorems. A measure is then proposed for computing the strength or width within a document of a term used to characterize it, and it is shown that the formal system of connectedness has a graph-theoretical formulation. Each graph is relative to a prescribed width of index terms and a given value of matching between terms. On the basis of such graphs, a document set may be given a topology, rendering possible the performance of those retrieval operations for non-static document collections described in Report No. 6 of this Series. (Author)

PB-166 422 Div. 32, 16
OTS Prices: HC $4.00/MF $0.75

National Library of Medicine, Washington, D. C.
THE NATIONAL LIBRARY OF MEDICINE INDEX MECHANIZATION PROJECT.
Rept. for 1 Jul 58-30 Jun 60.
1961, 106p
Unclassified report

Partly sponsored by the Council on Library Resources, Inc., Grant no. 28.
Pub. in the Bulletin of the Medical Library Association, 1961, v. 49, no. 1, pt. 2.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Libraries, Medical research), (*Medical research, Indexes), (*Indexes, Medical research), Periodicals, Reports, Bibliographies, Documentation, Subject indexing, Printing, Photographic equipment, Punched cards, Data storage systems, Information retrieval, Costs.

The project undertaken by the National Library of Medicine to improve its system of indexing current medical journal literature is described in detail. The specific aims of the NLM were to develop and demonstrate in the field of medicine improved methods for the rapid and efficient publication of comprehensive indexes to the literature of broad scientific fields with simultaneous provision for meeting the requirements of specialties within these fields, making use of hitherto unutilized mechanical applications.' The project, undertaken in 1958, set out to attain the following objectives: (1) to cover more journals, up to nearly twice as many articles as were currently being covered; (2) to improve currency still further; (3) to eliminate tedious composition, filing, and proofreading procedures; (4) to improve legibility; (5) to eliminate the shuttling back and forth from index to register that the Current List required of the user; (6) to discover and implement multiple and derivative uses of the prepared material; (7) to provide a demonstration of methods that might aid scientific indexes in general; and (8) to distinguish among index imperfections which might be cured by money, which by technological advances, which by education, arbitration, and convention, and which cures might be mutually incompatible.

PB-166 424 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Norair Div., Northrop Corp., Hawthorne, Calif.
REVIEW OF THE STATUS OF THE MULTIPLE MEANING PROBLEM IN MACHINE TRANSLATION OF NATURAL LANGUAGES.
Rept. no. 7,
by Ron Manly. Sep 60, 26p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Machine translation, Language), (*Language, Analysis), Information retrieval.

Vocabulary, Word association, Statistical analysis, Reviews.

The status of the major aspects of machine translation research and development programs is briefly reviewed. The major area of difficulty is indicated to be the polysemia or multiple meaning problem: the discovering of the characteristics that determine which multiple equivalent of a polysemantic word is correct in specific contexts. The present status of the multiple meaning problem is then discussed. A new technique for resolving multiple meaning problems based on more precise linguistic description is then considered. It is concluded that the multiple meaning problem may often be considerably complicated by not distinguishing between source and target language linguistic properties, especially their ambiguities and anomalies.

PB-166 425 Div. 32
OTS Prices: HC $2.00/MF $0.50

Ohio State Univ. Research Foundation, Columbus.
THE POSITION OF EMBEDDING TRANSFORMATIONS IN A GRAMMAR,
by Charles J. Fillmore. 1964, 32p POLA-3
Grant NSF G25055
Unclassified report

An earlier version of this paper was read before the Summer Meetings of the Linguistic Society of American in Seattle, Washington, on July 27, 1962.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Language, Analysis), Vocabulary, Symposia.

A generative grammar of the type proposed by Chomsky and currently being investigated in many quarters makes use of two types of transformational rules--the single-base or simple transformations, which may be thought of pre-systematically as converting a sentence from one form to another, and the double-base or generalized transformations, which may be thought of as combining two sentences to form a third. To date, the position of these two types of transformations with respect to each other has been left unspecified in the published writings of transformational grammarians, and it has been suggested by Lees that there may need to be a complex system of 'traffic rules' for indicating the possible ways in which the result of a particular generalized transformation may be channeled back to a specific position in the sequence of simple transformations. In this paper a general solution to the 'traffic rule' problem is proposed, and consideration is given to some of the ways in which this solution affects the construction of the transformational component of the grammar of English.

PB-166 428 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo-Wooldridge, Inc., Canoga Park, Calif.
'WORD BLOCK MODEL' FOR RUSSIAN-ENGLISH SYNTAX
by Don R. Swanson. 1964, 4p
Unclassified report

Descriptors: (*Machine translation, Operation), (*Language, Analysis), Programming (Computers), Documentation, Artificial intelligence.

The major syntactic categories of Russian scientific text discussed are inflection, insertion, choice of multiple equivalents, and word order. A machine method for syntactic analysis of Russian-English translation was developed which uses rules based on the 'word block model' (phrase analysis of the sentence.). The machine procedure is briefly outlined.

PB-166 429 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AUTOMATIC CONTENT ANALYSIS: SOME ENTRIES FOR A TRANSFORMATION CATALOG,
by D. G. Hays. 8 Apr 60, 21p P-1962
Unclassified report

Prepared for presentation at meeting of Western Sociological Association, Spokane, Washington, April 28-30, 1960.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Machine translation, Language), (*Language, Machine translation), Psychology, Sociology, Word association, Automatic, Data processing systems.

A system for automatic content analysis includes a sentence-structure determination, or parsing, routine, a routine for linguistic simplification, and a routine for transformation from linguistic to sociological variables. This paper reviews the first two steps, illustrates the information requirements of the third step, and discusses alternative measurement techniques in content analysis as potential bases for automatization.

PB-166 431 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE QUANTIFICATION OF FUNCTIONAL LOAD,
by Charles F. Hockett. 7 Jun 61, 31p P-2338
Unclassified report

Prepared in cooperation with Cornell Univ., Ithaca, N.Y.

Descriptors: (*Language, Theory), Communication theory, Machine translation.

Functional load in linguistics is illustrated as the better contrast between some phonemes in a given system as compared with that of others. This paper seeks a practical way to quantify functional loads. The loads are treated in terms of phonemic contrasts, allophonic contrasts, and arbitrary symbols, such as the letters or marks of a writing system. Consideration of phonemes leads to the conclusion: if two phonemic systems share a succesor (predecessor), that successor (predecessor) is unique, where the predecessor and successor are the immediate ancestor and descendant, respectively. In measure of phonemic contrasts; alternatives receive attention when the contribution between the contrast of phonemes /a/ and /b/ is withdrawn: (1) the job done by the whole system is rendered smaller or (2) the total job remains the same, and the share no longer carried by the last contrast is divided among the remaining contrasts. An allophonic system is regarded as system changing if it changes its number of phonemes or alters the contrasts in some environment or both. Quantification of the load for graphic symbols as used in mechanical translation might allow omissions in the information in a source text or about a source language.

PB-166 436 Div. 32
OTS Prices: HC $1.00/MF $0.50

Teleregister Corp., Stamford, Conn.
A MODERN APPROACH TO THE PROBLEMS OF SPACE AND ACCESSIBILITY: AMFIS, THE AUTOMATIC MICROFILM INFORMATION SYSTEM,
by Emik A. Avakian and Eugene Garfield. 1957, 4p
Unclassified report

Pub. in Special Libraries, 1957, Apr. Prepared in cooperation with DocuMation, Inc., Woodbury, N. J.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Documentation, Microfilm), (*Microfilm, Documentation), (*Information retrieval, Microfilm), Film readers, Mechanical drawings, Storage, Libraries.

In the Automatic Microfilm Information System (AMFIS), it is assumed that one knows what document he is seeking and what its call number is AMFIS is a fast system of retrieving documents--but only in the physical sense, not in the sense of literature 'searching.' Regardless of how he determines the great volume of documents he must inspect, the researcher today must have immediate access to these documents. AMFIS provides just that. Indeed, access to any one of several million documents is now possible in a matter of seconds with a minimum of physical effort. Furthermore, it is actually possible with this system not merely to edit groups of microfilm frames but also to physically delete or add within seconds single frames or groups of frames of microfilm. This ability to edit with ease makes AMFIS an open system as contrasted to closed systems, such as microfilm reels or the Rapid Selector.

PB-166 438 Div. 32
OTS Prices: HC $1.00/MF $0.50

Patent Office, Washington, D. C.
INFORMATION RETRIEVAL RESEARCH IN THE U. S. PATENT OFFICE,
by Simon M. Newman. Jun 60, 15p
Unclassified report

Printed in MULL (Modern Uses of Logic in Law): Quarterly Newsletter of the Electronic Data Retrieval Committee of the American Bar Association, Vol. 1, No. 4, Jun 60, pp. 45-55.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Patents), (*Patents, Information retrieval), (*Information retrieval, Research program administration), Steroids, Organic compounds, Data processing systems.

A history is given of the retrieval of information in the U. S. Patent Office. The first attempt at automation of patent searching was in 1947 in the Chemical Division of the Classification Group. The mechanized system proposed was not sophisticated enough for patent searching. Project Haystaq was started as an experimental effort on long-range studies to develop a completely comprehensive search routine for a large data processing system. This was a joint effort with the Data Processing Systems Division of the National Bureau of Standards. Other activities included efforts in steroid chemistry, a topological search for organic compounds programmed on the SEAC of the NBS, introduction of generic and subgeneric terminology representative of chemical structure diagrams, and the attempt at representation of a concept in any technical discipline in unique, precise, and unambigous terminology: the metalanguage 'Ruly English.' Patents are seen as using terms on different levels of generality and specificity. Any phenomenon may be described by any of a number of different facets or aspects of its nature, such facets or aspects usually occurring on different levels of generality; much of the significant information in technical prose, moreover, is present by implication rather than being explicitly expressed.

PB-166 440 Div. 32
OTS Prices: HC $1.00/MF $0.50

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
THE NEW LOOK IN LIBRARY SCIENCE,
by J. W. Perry and Allen Kent. Nov 56, 4p
Unclassified report

Pub. in Applied Mechanics Reviews, vol. 9, no. 11, p. 457-460.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Libraries, Information retrieval), (*Information retrieval, Libraries), (*Scientific research, Information retrieval), United States government, Reports, Records, Storage, Subject indexing, Punched cards, Abstracting, Automatic, Documentation.

New equipment, methods, and techniques are providing new tools to facilitate the recall of information from storage. As the capabilities of these tools become better understood, their widespread application gives promise of enabling us to achieve a major advance in correlating and utilizing recorded knowledge. A key operation in this connection is the processing of large volumes of information so that the newer searching and correlating techniques may be applied to best advantage. Centralized processing of the information of interest to an entire industry or major branch of science appears to be the most economical approach. The pioneering work now being sponsored by the American Society for Metals on behalf of the metallurgical industry is pointing the way to the future, not only in the broad realm of science and technology but also in other fields of professional activity, such as law and medicine.

PB-166 441 Div. 32, 17, 26
OTS Prices: HC $1.00/MF $0.50

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
CREATIVE THINKING IN THE LIBRARY,
by Allen Kent. 4 Jun 56, 12p
Unclassified report

Prepared for presentation before the Special Libraries Association, Pittsburgh, Pa., 4 Jun 56.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Libraries, Information retrieval), (*Information retrieval, Libraries), (*Metallurgy, Libraries), (*Management engineering, Scientific research), Industrial research, Documentation, Storage, Scientific personnel, Personnel management, Decision making.

The library is a tool for creative work in much the same manner as the laboratory. The aim of research is to solve problems. It matters little whether the information required is obtained from the literature or from the laboratory. However, it is important to know how to use the information derived from either source to best advantage and to consider comparative costs in money, effort and time. A survey of special libraries in a sample of 100 metallurgical companies has been conducted in order to obtain information about the awareness of management of the contribution that the library can make to the research effort. Preliminary results of this survey are presented. (Author)

PB-166 448 Div. 32
OTS Prices: HC $1.00/MF $0.50

American Inst. of Physics, New York.
THE ROLE OF 'LETTERS' JOURNALS IN PRIMARY DISTRIBUTION OF INFORMATION; A SURVEY OF AUTHORS OF PHYSICAL REVIEW LETTERS,
by Pauline Atherton. Jul 64, 10p AIP/DRP-64-1
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Periodicals, Documentation), (*Documentation, Periodicals), Reports, Physics, Classification, Information retrieval, Abstracting, Subject indexing, Distribution.

The authors of the 409 letters in the 1961 issues of Physical Review Letters were asked whether the material in their letters had been published subsequently in fuller and more detailed papers. Of the 377 who responded, 215 (57%) indicated that no further publication of the material had occurred. A study of the placement of abstracts of these letters in Physics Abstracts showed that 199 of the 409 letters were classified within the fields of Elementary Particles, Low Temperature Physics, and Magnetic Properties of Solids, with the rest distributed over all other fields. Work reported in 117 of the 199 letters was not published elsewhere. Of the 162 papers amplifying publication in letter form, over 70 were reported as published in The Physical Review, with the balance in 28 other journals and the proceedings of 15 conferences. (Author)

PB-166 449 Div. 32
OTS Prices: HC $1.00/MF $0.50

Library of Congress, Washington, D. C. General Reference and Bibliography Div.
MECHANIZATION AND SUBJECT HEADINGS,
by Henry J. Dubester. 1962, 5p
Unclassified report

Presented to the ALA Cataloging Policy and Research Committee, 29 Jan 62.
Pub. in Library Resources and Technical Services, 1962, v. 6, no. 3.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Automatic), (*Subject indexing, Automatic), Libraries, Symposia, Documentation, Storage.

On hearing that a grant by the Council on Library Resources had been made to the Library of Congress for a study of the possibilities of mechanizing the information system of the Library of Congress and large research libraries in general, the Cataloging Policy and Research Committee expressed the opinion that 'the proposed survey at the Library of Congress is most intimately related to the need for a code for subject headings. To cope with the complex of subject concepts and the terminology required to express these concepts, under a scheme of automated storage and retrieval, a well-defined and adequately-stated theory of how the concepts are to be organized into a system, and how expressed is essential.' The conduct of the survey is described in the report.

PB-166 451 Div. 32
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ. Research Foundation, Columbus.
SOME SYNTACTIC RULES IN MANDARIN,
by W. S-Y. Wang. 1963, 22p Pola-3
Unclassified report

Descriptors: (*Language, China), Speech representation, Analysis.

After a brief discussion of earlier linguistic literature, an attempt is made to design a grammar for Mandarin. The syntatic rules presented constitute but a small fragment of what a generative grammar of Mandarin may eventually look like. The rules are mostly a formalization of much of the information which is discursively scattered in the literature of Chinese linguistics. Although an adequate generative grammar for Mandarin will be long in forthcoming, the sketch presented is intended to be a modest first step in that direction. Clearly, many of these rules will need to be modified and refined, and numerous grammatical categories will need to be added as increasingly more facts are built into the grammar.

PB-166 458 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
ANTICIPATED DEVELOPMENTS IN MACHINE LITERATURE PROCESSING IN THE NEXT DECADE,
by R. F. Simmons. 10 Mar 60, 18p SP-129
Unclassified report

Prepared for presentation at the Western Psychological Association Symposium, 'Machine Literature Search in Human Factors,' San Jose, Calif., Apr 60.

Descriptors: (*Data processing systems, Automation), Machine translation, Reading machines, Input-output devices, Computer storage devices, Information retrieval, Programming (Computers), Documentation, Game theory, Microfilm, Language, Reviews.

Possible development of the 'memex' and 'synthex' machines is discussed. Memex would have a capability for microfilm storage of a university library with instant retrieval by index or associative codes. Synthex is intended as an information synthesizor. The feasibility of memex and synthex is predicted from current developments of cryotons, magnetic film memories, document readers, and programming research.

PB-166 459 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
AUTOMATED ANALYSIS AND CODING OF ENGLISH GRAMMAR FOR INFORMATION PROCESSING SYSTEMS,
by Sheldon Klein and Robert F. Simmons. 28 Aug 61, 18p SP-490
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Language, Analysis), (*Data processing systems, Language), Computer storage devices, Programming (Computers), Automation, Identification, Artificial intelligence.

Grammatical analysis is discussed as a necessary procedure in information processing. Analysis of work class, phrase class, and clause class is presented. The grammatical encoder of protosynthex and the question answerer are described.

PB-166 460 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
AUTOMATIC ANALYSIS OF THE CONTENTS OF DOCUMENTS. PART II: DOCUMENT SEARCHES AND CONDENSED REPRESENTATIONS.
Field note,
by R. E. Wyllys. 10 Jan 62, 26p SDC-FN-6170
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also PB-166 462.

Descriptors: (*Information retrieval, Analysis), Data processing systems, Abstracting, Indexes, Reports, Computers.

Condensed representations of the contents of documents serve both a search-tool function and a content-revealing function. The search-tool function and the document-search process were examined in some detail in order to suggest some desirable features for search processes in automated document-retrieval systems. The beginnings of a theory for measuring the effectiveness of search processes is proposed. Also, a discussion is presented of human-produced condensed representations from the viewpoint of their use as search tools.

PB-166 462 Div. 32, 28, 30
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
BUILDING A CONCEPT NETWORK FOR RETRIEVING INFORMATION FROM LARGE LIBRARIES: PART I.
Technical memo.,
by John Olney. 26 Jan 62, 41p SDC-TM-634/001/00
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Libraries), (*Classification, Information retrieval), (*Memory, Information retrieval), Subject indexing, Reasoning, Reports, Computers, Bionics, Artificial intelligence.

The report appraises the strengths and weaknesses of some current methods of document retrieval. A need for characterizing documents in terms of their cognitive content is shown, and the unfeasibility of perfecting conventional indexing to meet this need is indicated. A detailed analysis is included of the process by which a human being characterizes documents cognitively while reading them. An account is given of how the resulting characterizations are searched when documents are cited from memory. The paper is concluded with a discussion of the feasibility of developing and using a machine version of the classification of document contents provided in the organization of human memory.

PB-166 463 Div. 32
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
A COMPARISON OF HUMAN PERFORMANCE UNDER NATURAL LANGUAGE AND TERM DIAGRAM PROCEDURES FOR THE PRODUCTION OF REPORT SUMMARIES.
Technical memo.,
by John D. Ford, Jr. and Emory H. Holmes. 6 Feb 62, 16p SDC-TM-662/000/00
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Abstracting, Information retrieval), (*Information retrieval, Abstracting), (*Performance (Human), Abstracting), Language, Reports, Storage, Automatic, Data storage systems, Programming (Computers), Programming languages, Simulation, Documentation, Design, Decision making.

The present experiment should be viewed from two contexts. First, it should be considered as an experimental study to increase our understanding of how human beings extract information from natural language expressions. Second, it may be regarded as a preliminary study of human performance in the production of report summaries in which severe format restrictions result in a task which departs drastically from the natural language habits of human beings. Such format restrictions appear similar to restrictions which might occur at a man-machine communication console in a real-time storage and retrieval system.

PB-166 465 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
THE DESCRIPTOR WORD INDEX PROGRAM.
Field note,
by Eileen Stone. 1 Jun 62, 13p SDC-FN-6599
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Subject indexing, Data processing systems), (*Indexes, Programming (Computers)), Documentation, Dictionaries, Vocabulary, Information retrieval.

The Descriptor Word Index Program is used to describe a natural text input by analyzing its word content and developing index systems which reflect the kind of information contained within the referent text. The system was written for the IBM 7090 and consists of four functional programs, FEAT, PSI, LIST, and PUNCH.

PB-166 467 Div. 32
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
DISCUSSION OF A PROPOSED STUDY OF ASSOCIATIONS DERIVED FROM TEXT.
Field note,
by L. B. Doyle. 5 Dec 61, 11p FN-6081
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-284 259.

Descriptors: (*Reports, Information retrieval), (*Information retrieval, Statistical analysis), Subject analysis, Automatic, Documentation.

Plans and facilities are proposed for a study of the co-occurrence of words in text, with the hope of triggering the associative processes of a literature searcher by confronting him with some kind of output of a computer-based statistical analysis of text. A Jovial program is being written for use on the Philco 2000 which will allow deletion of words from text so that an unlimited number of 'libraries' can be dealt with which are subsets of an initially input corpus of text. A program will measure the associatedness between all possible pairs of words in the experimental library, and the most strongly associated word pairs will be picked out and printed in a meaningful and useful arrangement. These associated word pairs will be used (1) to construct an association map showing the pattern formed by large numbers of strongly associated word pairs, (2) for citation in research reports as illustration of significant phenomena, and (3) as a basis for deciding which library subset to deal with in a subsequent run. The intention is to establish for each document a list of 12 words within which will be 66 co-occurring pairs of words.

PB-166 468 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
FEAT, AN INVENTORY PROGRAM FOR INFORMATION RETRIEVAL,
by John C. Olney. 25 Jul 60, 7p FN-4018
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Data storage systems), (*Data processing systems, Information retrieval), Input-output devices, Computers, Data processing systems.

FEAT is designed to perform frequency and summary counts of words and word pairs occurring in its natural text input; i.e., text written in ordinary English and transcribed into hollerith code according to some set of keypunching rules. To focus attention on the semantic aspect of word pairs rather than on their syntactic aspect, pairs of which one member is a function word, such as 'the,' 'is,' 'by,' etc., are excluded. Thus, the title of this document yields only two word pairs, 'Inventory Program' and 'Information Retrieval.' Word pairs are listed both in natural order and in reverse order, so that they can be looked up under either member of the pair.

PB-166 470 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
LIBRARY SCIENCE IN THE COMPUTER AGE,
by Lauren Doyle. 17 Dec 59, 24p SP-141
Unclassified report

Descriptors: (*Libraries, Information retrieval), (*Information retrieval, Automatic), Subject indexing, Abstracting, Language, Probability, Digital computers, Programming (Computers), Pattern recognition.

The paper discusses areas of investigation with which library science must concern itself in anticipation of the advent of such tool complexes as photoelectric character readers, ultra-large random access digital computer memories, and automatic coding. Topics considered are: words as the ultimate units of library structure; word usage frequency as a measure of subject content; relationship of local word frequencies to the retrieval precision factor; the concept of units of meaning; relationship of probability and meaning; precise information retrieval as a major application of library science; some long-range theoretical and practical problems.

PB-166 472 Div. 32
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
A PERMUTATION INDEX TO THE 'PREPRINTS OF THE INTERNATIONAL CONFERENCE ON SCIENTIFIC INFORMATION.'
Revised ed.,
by Joan Citron, Lewis Hart, and Herbert Ohlman.
15 Dec 59, 42p SP-44
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Indexes, Automatic), (*Information retrieval, Indexes), Symposia, Reports, Subject indexing, Punched cards, Data processing systems, Permutations, Documentation.

This index was prepared by the System Development Corporation using a method called permutation indexing. Every conference paper is included, entries being selected manually from the titles, authors' names and affiliations, headings, captions, sentences, and phrases of the text. Sentences and phrases were selected for their significance as thought units, and not necessarily because they were rich in individual retrieval terms. Data-processing machines produce the entries from keypunched natural text without further manual intervention. The process consists of alternate reproduction and selection, followed by sorting and listing. The method is called permutation indexing because it employs cyclic permutations of words. Each indexible word is thereby brought to a central position and is alphabetized.

PB-166 473 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
PROGRAM DESCRIPTION OF PHILCO TRANSAC IMPLEMENTATION OF IPL-V,
by S. S. Shaffer. 11 Jun 62, 9p FN-6627
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Programming languages, Design), (*Data processing systems, Programming (Computers)), Digital computers, Simulation, Information retrieval.

The report contains a description of IPLT, an implementation of IPL-V on the Philco Transac 2000 computer. The information is intended to constitute a machine system description and to supplement the detailed description of the IPL-V system and language contained in the manual, INFORMATION PROCESSING LANGUAGE-V MANUAL, edited by Allen Newell, published by Prentice-Hall, Inc., 1961. IPL is a formal language designed primarily for investigations of complex information processing such as is carried out by humans in thinking and problem-solving activities. The language is not well suited for handling numerical problems or arithmetic models of nonnumerical problems. Implementations of IPL to date have all consisted of simulations of the system on digital computers since the basic instructions of the system cannot be executed directly by the logic of our present available computers. The IPLT version of IPL-V was accomplished by translating the RAND 7090 version into JOVIAL and compiling it for the Philco Transac. The document describes the deviations and additions to the system as described in the IPL-V manual and procedures for using IPLT on SDC's Philco Transac.

PB-166 475 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
A SURVEY OF INFORMATION RETRIEVAL RESEARCH AT SDC DURING THE YEARS 1959 AND 1960.
Field note,
by L. B. Doyle. 12 Jun 61, 6p FN-5619
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Reviews), Subject indexing, Abstracting, Automatic, Language, Statistical analysis, Programming (Computers).

A summary is given of researches in the following fields and the major conclusions derived therefrom: automatic indexing, condensed representation of documents, finding content indicators by statistical means, and association maps and topical indicators.

PB-166 476 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
TOWARD THE CONSTRUCTION OF A SEMANTIC CODE.
Field note,
by Dorita Lochak Wasser. 20 Feb 62, 11p FN-6276
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Language, Analysis), (*Classification, Language), Data processing systems, Information retrieval, Subject indexing, Vocabulary, Machine translation, Abstracting, Computers, Acoustics, Speech.

A procedure was described for empirically categorizing the semantic elements of language. The linguistic analysis affords a basis for treating semantic function classes by statistical techniques in order to provide a sound procedure for computer processing of text and greater insight into the semantic properties of language.

PB-166 477 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
KEYPUNCHING INSTRUCTIONS FOR TOTAL TEXT INPUT,
by Louis C. Ray. 1961, 7p
Unclassified report

Prepared for presentation at the Institute on Information Storage and Retrieval (3rd), American Univ., Washington, D. C. 13-17 Feb 61.

Descriptors: (*Punched cards, Data processing systems), (*Language, Data processing systems), Information retrieval, Input-output devices, Machine translation, Automatic, Abstracting, Operators (Personnel).

In recent years, there has been an increasing amount of investigation on the use of automatic data processing systems for handling natural language text. Due to the increased availability and power of computing equipment, more and more researchers are at work studying and developing both procedures and concepts for machine translation, automatic indexing, information retrieval, automatic abstracting and other problem areas involving large amounts of data in free format. These problem areas each involve a number of factors. Of the factors they share in common, one factor, the method of obtaining natural language text in a machine readable form, is the subject of this paper.

PB-166 486 Div. 32
OTS Prices: HC $2.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
ON STOCHASTIC MODELS OF THE PATENT OFFICE EXAMINING SYSTEM,
by E. C. Bryant. Apr 63, 32p WRA-PO-8
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Patents, Mathematical models), (*Information retrieval, Patents), Stochastic processes, Probability.

An outline is given of the examining process that indicates flow of actions through a network of stations. TRANSITION MODEL: This model attaches probabilities to passage of actions from one station to another and is independent of time. A matrix of transition probabilities having the independence property of a Markov chain was constructed by adding stations during the passage of an application. The stations include source of application, examination by applicant, first amendment by applicant, review of first amendment, and second amendment by applicant. A matrix of transitional probabilities is given also for hypothetical data, with designation of 5 stations: source of application, original examination, i-th return to source, i-th subsequent review by examiner, Board of Appeals, issue, and abondonment. A tree diagram of transition probabilities is given that may answer questions as to (1) the proportion of original applications ending up in issue or abondonment, and (2) the average number of times an examiner must take action. TIME-DEPENDENT MODEL traces the location of the application or action during each successive time increment. With this model attempts may be made at (1) equalizing the ages of the oldest new application and the oldest amended application, and determining the number of examiners required to accomplish the work load under equilibrium conditions.

PB-166 487 Div. 32
OTS Prices: HC $2.00/MF $0.50

Westat Research Analysts, Inc., Denver, Col.
SOME TECHNICAL NOTES ON CODING ERRORS,
by E. C. Bryant, D. W. King, and P. J. Terragno.
Jul 63, 31p WRA-PO-7
Contract Cc6078
Unclassified report

Descriptors: (*Information retrieval, Errors), (*Programming (Computers), Subject indexing), (*Subject indexing, Programming (Computers)), Search theory, Probability, Analysis of variance.

The topics covered in this report are: (A) Comments on the importance of coding errors; (B) An empirical study of consistency and accuracy; and (C) Variances of the number of matched terms by a set of K analysts.

PB-166 488 Div. 32
OTS Prices: HC $4.00/MF $1.00

Westat Research Analysts, Inc., Denver, Colo.
ANALYSIS OF AN INDEXING AND RETRIEVAL EXPERIMENT FOR THE ORGANOMETALLIC FILE OF THE U. S. PATENT OFFICE,
by E. C. Bryant, D. W. King, and P. J. Terragno.
Aug 63, 136p WRA-PO-10
Contract Cc6078
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Subject indexing, Reliability), (*Metalorganic compounds, Patents), (*Information retrieval, Effectiveness), Analysis.

The indexing system investigated was based upon connections and descriptions of chemical fragments, thus permitting a high degree of accuracy of indexing. In terms of consistency, about 73% of the co es selected by either of 2 indexers were selected by b th. An indexing consisting of all of the codes selected by e ther of 2 independent analysts achieved a retrieval of 91% which a 'perfect' indexing would yield, with a false retrieval of only 33% more than perfect indexing. There was evidence of an experience effect when reviewed indexings, rather that set sums of independent indexings, were used, and also there was evidence of interactions between the analysts and reviewers. The hypothesis that a reviewer will cut out superfluous codes was discredited. Searches were conducted using actual questions formed by examiners and synthetic questions formed by analysts. Although there were differences in the results, the principal conclusions would have been the same had either set of questions been used alone. The model of an earlier report (WRA PO 7, PB-166 487) was tested experimentally and found representative of actual practice for indexings accomplished by 2 or more analysts. For single analysts, an adjustment must be made for the dependence of indexing accuracy from code to code within the document.

PB-166 489 Div. 32, 4, 8
OTS Prices: HC $1.00/MF $0.50

Westat Research Analysts, Denver, Colo.
REVISED DESIGN FOR CODING EXPERIMENT, 307/88.5 FILE,
by Edward C. Bryant, Donald W. King, and P. James Terragno. 19 Jun 63, 5p WRA-PO-9
Contract Cc5931

Unclassified report

Descriptors: (*Classification, Reports), (*Metalorganic compounds, Identification), Documentation, Design, Scientific personnel, Circuits, Transistors, Analysis, Subject indexing.

Documents on transistor circuits and metalorganic compounds were analyzed and coded according to subject content. A revised design for this coding is presented. An experimental arrangement was devised whereby comparisons of modes and coders within documents could be made.

PB-166 490 Div. 32
OTS Prices: HC $1.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
PRELIMINARY NOTE ON ESTIMATION OF ACCURACY FROM CONSISTENCY OF INDEXING,
by E. C. Bryant. Jul 63, 4p WRA-PO-11
Contract Cc6078

Unclassified report

Descriptors: (*Subject indexing, Reliability), (*Information retrieval, Effectiveness), Probability, Mathematical models, Errors, Patents, Metalorganic compounds.

A mathematical model is given concerning the probability than an applicable term is critical in determining the number of suitable documents that will be retrieved in an intersection search (PB-166 487). Maximum likelihood estimating equations are derived for which there have been some solutions by iterative methods. The suggestion is made that empirical results from data already collected in the organometallics file (PB-166 488) be used in determining the merit or validity of the proposed kind of analysis on consistency.

PB-166 491 Div. 32
OTS Prices: HC $3.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
EVALUATION OF ANALOG-TO-DIGITAL CONVERTER PATENT INFORMATION RETRIEVAL SYSTEMS,
by D. W. King. Jun 64, 42p WRA-PO-12
Contract Cc6078

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Tests), (*Patents, Information retrieval), Subject indexing, Classification, Digital-to-analog converters, Analog-to-digital converters, Input-output devices, Reliability.

One evaluation was made of the system of punched cards for information retrieval within subclass 340/347 of the U.S. Patent Office, and another was made of a similar file from the Netherlands' Patent Office. Three index and search systems were involved. Subclass 340/347 is called 'code converters' and includes analog-to-digital, digital-to-analog, and digital-to-other-digital converters; it was searched manually through file drawers. The U.S. coordinate index system was searched by needle sorting on Keysort cards and manual retrieval from special files of a duplicate set of patents in the subclass. The Netherlands' coordinate index term index system was searched by passing IBM cards through a tabulator wired to give a selective printout of the identifications of the documents matching a question. The U.S. coordinate index system is regarded an improvement over manual classification, principally in reducing search time with possible better reliability. The Netherlands system performed well, fewer than 20% of the relevant documents on the average being missed.

PB-166 492 Div. 32
OTS Prices: HC $2.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
SEARCH-SYSTEM EVALUATION IN THE UNITED STATES PATENT OFFICE.
Progress rept.,
by Edward C. Bryant. May 64, 27p WRA-PO-14
Contract Cc6078

Unclassified report

Descriptors: (*Information retrieval, Patents), Mathematical models, Stochastic processes, Classification.

The purpose of this paper is to report progress toward development of objective criteria for evaluation of storage, search and retrieval systems and their application to specific problems of the U. S. Patent Office. Part of the research referred to has appeared in technical journals, part in Patent Office publications, part in working memoranda, and some is not yet reported in a formal manner. This paper will not attempt to reproduce these extensive reports, but will restate their principal conclusions and show how they all fit together as pieces of a coordinated evaluation project.

PB-166 507 Div. 32
OTS Prices: HC $1.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
SOME NOTES ON SEARCH STRATEGIES,
by D. W. King. Oct 64, 18p

Unclassified report

Prepared for presentation at the Annual Meeting of the International Cooperation in Information Retrieval Among Patent Offices (4th) (ICIREPAT), Washington, D. C., Oct 64.

Descriptors: (*Information retrieval, Search theory), Reports, Subject indexing, Patents, Documentation, Effectiveness, Language.

Search strategies involve the selection of terms, number of terms used, logical relationship of search queries, and rules for terminating a search, specifically with respect to coordinate indexing systems. A schematic diagram is given for describing various levels of relevance and sources of failure at each level. Inability of an examiner to retrieve an unexpressed set of documents that he needs from a file may be attributed to a natural language gap, an indexing language gap, searching errors, and input errors. A search results in documents not found, relevant documents found, and unwanted documents retrieved. Three search strategies were observed in small coordinate indexing systems evaluated in the U. S. Patent Office (PB-166 488, -166 491, and -166 508). They consist of (1) selecting terms for the initial search query and replacing a part of them by new terms for subsequent queries, (2) selecting terms similarly for an initial query and dropping terms off in order of least importance for subsequent queries, and (3) selecting terms and ranking documents by the number of terms appearing in the document. U. S. Patent Office experiments have given information on relevance and recall ratios.

PB-166 508 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
SEARCH TESTS OF AN EXPERIMENTAL FILE OF ELECTRONIC CIRCUITS,
by Donald W. King, Donald P. Stein, and Joseph Stitelman. 1964, 38p
Unclassified report

Paper presented at The Annual International Cooperation in Information Retrieval Among Patent Offices (ICIREPAT Meeting) Washington, D. C., October, 1964.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Patents), (*Patents, Information retrieval), Documentation, Transistors, Classification, Effectiveness, Search theory.

Evaluation was made of searches conducted on transistor patents, U.S. Class 307, subclass 88.5. Three operational modes were used; S1, classification search and manual retrieval system with a sample of documents added at the completion of the entire search for each application; S2, coordinate index search and microfilm viewer retrieval system with a similar document sample to S1; and S3, coordinate index search and viewer retrieval system with a sample of documents added at the completion of each search query. An indexing experiment was performed to measure the extent of input errors, to establish their effect on system performance, and to compare indexer modes regarding indexing errors and costs. Search results were evaluated in part by analyzing and interpreting the retrieval profile, a table depicting the cell entries into which a set of file documents is classed as a result of system search and retrieval. Results for manual and machine systems on retrieval for one best reference were not statistically significant. The manual system performed better for retrieving all relevant references and all the best references. Search strategies were the main weakness for the machine system. Search tests indicated that far fewer and more general terms would yield enough small retrievals with high recall ratios to give substantial reduction in search effort over manual files.

PB-166 509 Div. 32
OTS Prices: HC $2.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
PROGRESS TOWARD EVALUATION OF INFORMATION RETRIEVAL SYSTEMS,
Edward C. Bryant. Oct 64, 23p
Unclassified report

Work accomplished under contract to the United States Patent Office.
Prepared for presentation at the 4th Annual Meeting of the International Cooperation in Information Retrieval Among Patent Offices (ICIREPAT Meeting), Washington, D. C. October 1964.

Descriptors: (*Information retrieval, Effectiveness), Search theory, Subject indexing, Documentation, Patents, Analysis.

Persistence of the problem of evaluation is claimed to be related to the following difficulties: lacks of meaningful retrieval models and well defined objectives; uncertainties concerning measurement criteria and over the meaning of relevance; difficulty of obtaining representative search questions; and problems of scale, design and interpretation, and proprietary interest. This report gives the details of representative successes and failures in the evaluation of the effectiveness of information retrieval systems. Suggestions are given also for procedures to be followed in proceeding with or circumventing some of the problems of evaluation.

PB-166 510 Div. 32
OTS Prices: HC $1.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
MEASUREMENT, MODELING, EXPERIMENTATION, AND EVALUATION IN INFORMATION RETRIEVAL SYSTEMS,
by Edward C. Bryant. 11 Sep 63, 17p
Unclassified report

Paper presented at The Annual Meeting of the International Cooperation in Information Retrieval Among Patent Offices (3rd) (ICIREPAT Meeting) Vienna, Austria, Sep 63.

Descriptors: (*Information retrieval, Patents), (*Patents, Mathematical models), Measurement, Subject indexing, Systems engineering.

MEASUREMENT: Three areas are suggested for measurement, since the efficiency with which an information retrieval component works will affect the (1) cost, (2) quantity of output, and (3) quality of output. The measurement of an existing system is claimed to imply much judgment concerning what characteristics to measure and their interrelationships, an approach to which is under experimentation at the U. S. Patent Office. MODELING: In the model of the Patent Office examining system (PB-166 486), a stochastic matrix is evolved in which entries in the rows show probabilities of passage from one station to another (i.e. from examiner to applicant or interference or issuance). EXPERIMENTATION: An indexing experiment in the transistor circuits file of the Patent Office is described. The design represents a basic module which can be repeated to employ more documents. EVALUATION: Evaluation of experiments is considered essential in order to decide whether further experimentation of a system is required or whether the system must be modified.

PB-166 511 Div. 32
OTS Prices: HC $1.00/MF $0.50

Westat Research Analysts, Inc., Denver, Colo.
FURTHER NOTES ON ASSOCIATIVE RETRIEVAL,
by Edward C. Bryant. 28 Feb 64, 12p WRA-PO-13
Contract Cc6078
Unclassified report

Also includes: Some Notes on Associative Retrieval, 28 Jan 64.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Search theory), Transformations (Mathematics), Mathematical analysis, Theory.

SOME NOTES; Association in information retrieval is regarded as a linear transformation that partially orders the documents in a file, based upon the characteristics of the documents filed and the specifications of a search question (Giuliano and Jones. 'Linear Associative Information Retrieval' (AD-290 313). Chapter 2 in Howerton and Weeks 'Vistas in Information Handling, vol. 1. Washington, Spartan Books, 1963). An association matrix is evaluated where term is plotted against term; the principal role of the matrix is to serve as an interface between the file indexed and the users. FURTHER NOTES: Another approach to retrieval is investigated where actual indexing is assumed a linear function of 'true' indexing plus an error. The linear function of the true indexing is an interpretation error, and the residual error matrix represents differences due to oversight, keypunching, or transcribing. The analysis leads to a contrast with the results of Giuliano and Jones.

PB-181 457 S1 Div. 32
OTS Prices: HC $3.00/MF $0.75

Defense Documentation Center, Alexandria, Va.
DDC SUPPLEMENT TO THE THESAURUS OF ASTIA DESCRIPTORS, SECOND EDITION.
Apr 64, 74p
Unclassified report

Descriptors: (*Information retrieval, Subject indexes), (*Subject indexes, Information retrieval), Documentation, Library science.

Changes to the descriptor vocabulary since December 1962 have been collected and consolidated to prepare this supplement. Descriptors and scope notes are listed in the format of the Thesaurus of ASTIA Descriptors, second edition. In cases where entries differ, the supplement is to be considered authoritative. The primary purpose of this volume is to record the addition and deletion of descriptors. Additions appear as new entries. Deletions are recorded in the form of 'use' references; e. g., Airplane antennas use AIRCRAFT ANTENNAS AIRPLANE ANTENNAS, a second edition descriptor, is to be deleted from the second edition and AIRCRAFT ANTENNAS, a new term in this supplement, is to be used in future indexing. Although extensive revisions have been made in the 'also see' cross references, these changes are not recorded. Similar extensive changes have been made in the 'generic to' and 'specific to' categories of the second edition. Final authority for these is to be found in Descriptor Hierarchies, February 1964 and this supplement. Supplements will be issued on a cumulative basis as further changes to the second edition occur.

33. Transportation

PB-166 442 Div. 33, 30, 8
OTS Prices: HC $1.00/MF $0.50

Zator Co., Cambridge, Mass.
CHOICE AND CODING IN INFORMATION RETRIEVAL SYSTEMS,
by Calvin N. Mooers. Sep 54, 8p ZTB-100
Unclassified report

Presented at the Symposium on Information Theory, Massachusetts Inst. of Tech., 15-17 Sep 54. Reprinted from Transactions of the I. R. E., Professional Group on Information Theory (PGIT-4).
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Communication theory), (*Communication theory, Information retrieval), Subject indexing, Programming (Computers), Analog systems, Multiplex operation, Errors, Signals, Noise, Binary arithmetic.

Three topics are discussed. (1) The retrieval system analogue to the measure of the output of a source is developed. (2) The retrieval system analogues to synchronous and asynchronous multiplex types of coding are described and channel capacities are discussed. For the latter type of coding, called 'superimposed,' a new limit on channel capacity of log(e)2 bits per site is given; (3) Selection errors due to coding are discussed. It is shown that the frequency of errors can be made arbitrarily small for the superimposed type of coding, in analogue to the result for signalling. (Author)

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